

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

**STRATEGIC ISSUES OF INNOVATIVE FINANCING OF INFRASTRUCTURE
PROJECT DELIVERY**

BY

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DECLARATION

This is to certify that this work or any part thereof has not been previously submitted in any form to the University or to any other body whether for the purpose of assessment, publication or for any other purpose. I confirm that except for any express acknowledgements and references cited in the work, the original work is the result of my own efforts.

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ABSTRACT

The lack of research exploring the strategic issues of innovative financing of infrastructure projects delivery in Ghana formed the basis of the research. Little research has been done in Ghana on innovative financing of infrastructure projects delivery with majority concentrating on public-private partnerships, or the applicability of an innovative financing method. This dissertation aimed at identifying the challenges of innovative financing options available to Ghana, and analysing the strategic issues of innovative financing of infrastructure projects in Ghana. The research begun with the review of pertinent literature on innovative financing of infrastructure project, followed by in-depth exploratory interviews to ascertain the strategic issues of innovative financing of infrastructure projects in Ghana. Using purposive sampling technique, 81 questionnaires were distributed to the metropolitan, municipal, and district assemblies (MMDAs) in Ashanti Region. Out of the 81 questionnaires, 61 questionnaires were returned representing 75% response rate. The data was analysed using descriptive statistics, chi-square test, and factor analysis. The descriptive statistics and the test of hypotheses largely confirmed the variables which were identified in the literature and also through the exploratory interviews. The factor analyses of these variables resulted in 3 components each for both the challenges and the strategic issues of innovative financing of infrastructure project variables, and these were appropriately named and discussed. It was recommended that innovative financing options for infrastructure projects should thoroughly be assessed along the *appropriateness of the method, pricing and management, and sustainability of the method*. It was further recommended that policy makers, project management students, and staff of the MMDAs involved in the financing/provision of infrastructure projects should be educated on the identified issues.

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DEDICATION

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This dissertation is dedicated to Mr. Osei-Hwedie Anim.

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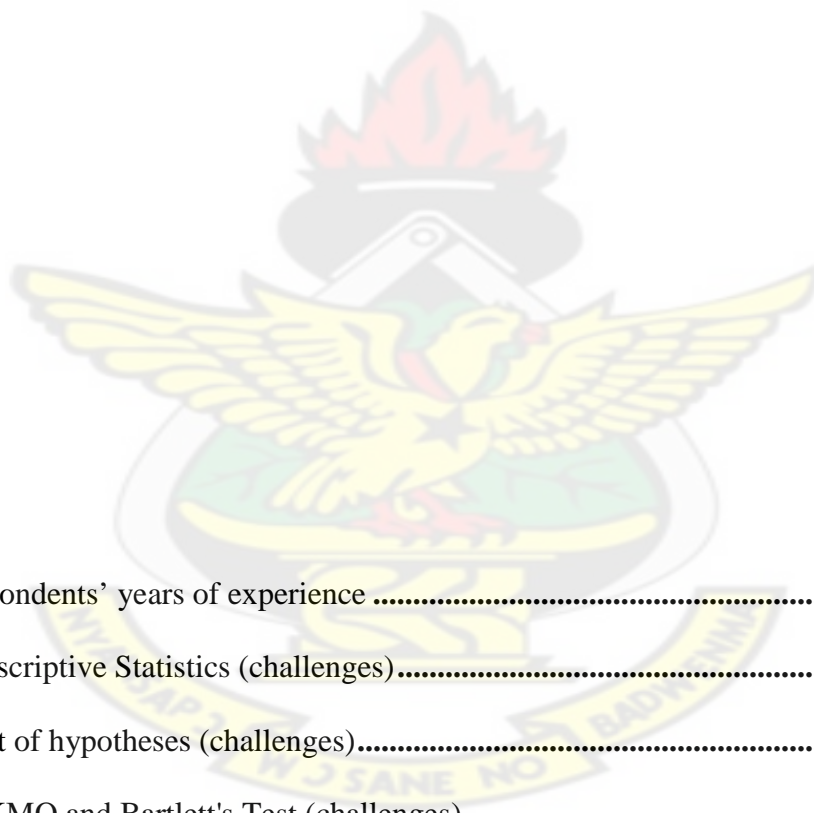
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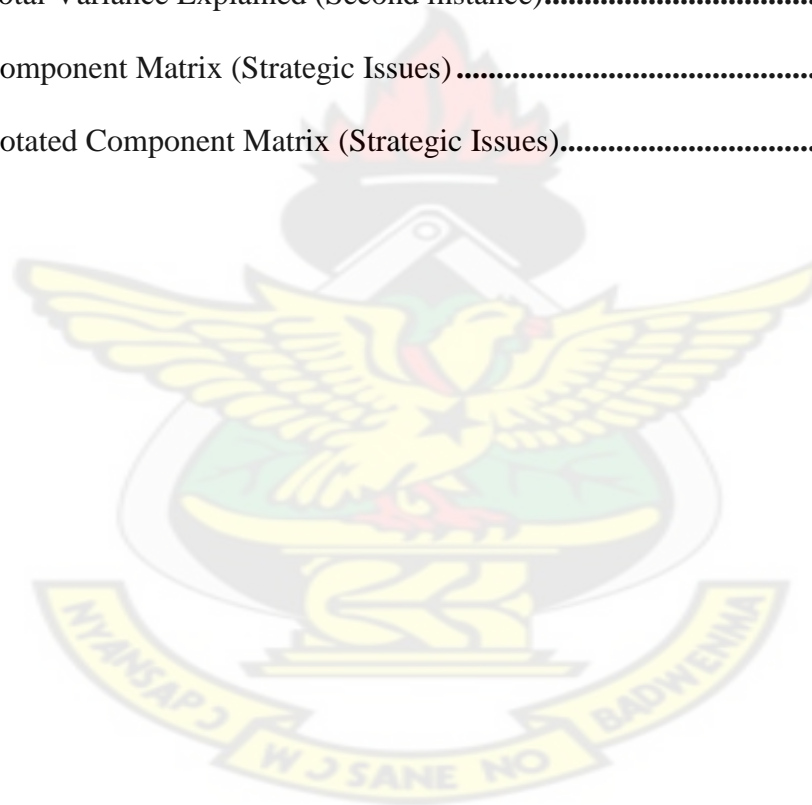
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CHAPTER ONE

GENERAL INTRODUCTION

1.0 INTRODUCTION

The purpose of this chapter is to introduce the topic and provide the reader with a prelude to the study. It presents the research context in terms of the background of the study and statement of the research problem addressed. The main aim of the study is stated, which is followed by specific research objectives, and the research questions. A summary of the research methodology adopted for the study is presented thereafter. Reflections on the significance of the study to Ghana are provided. Lastly, content of the dissertation is provided which gives the general arrangement and organisation of the dissertation.

1.1 BACKGROUND

The importance of reliable and well-developed infrastructure for the development of any nation hardly needs to be emphasized (Ngowi, et al., 2006). It is obvious that a sound public infrastructure plays a vital role in encouraging a more productive and competitive national economy and meeting public demands for safety, health, and improved quality of life. In addition, public office buildings, courthouses, and other facilities support non-economic goals and allow government agencies to carry out their missions (Guerrero, 2001). In view of this, governments across the globe have been struggling to achieve economic development and competitiveness through improving their basic infrastructure delivery (UNECF, 2008). Although globalization was expected to ensure that global capital markets, which have the depth, maturity, size and sophistication to fund all viable investments would ease financing of infrastructure

projects, this has not happened and demand for infrastructure, particularly in the developing countries has remained acute (Ngowi, et al., 2006). Undeniably, infrastructure deficit continues to be a contending problem facing many countries the world over, especially developing countries (UNECF, 2008).

Faced with the enormity of the country's problems and the paucity of resources available, the Government of Ghana in 2001, decided on a precise set of priorities to be pursued in the medium term within the framework of the Ghana Poverty Reduction Strategy (GPRS). Among the main objectives of the GPRS, was to improve basic infrastructure (The World Bank, 2002). However, improving infrastructure delivery has not been easy, and growing concerns about Ghana's infrastructure debt have raised interest in innovative options for financing current and future infrastructure projects. For instance, captured in its document "Ghana-Vision 2020", is the plan to utilize public-private-partnerships (PPP) as infrastructure projects delivery mechanism to foster the various development projects in the country (Owusu-Manu, 2008). Also, in another attempt at innovative ways of raising finance for infrastructure project delivery, the government of Ghana issued US\$ 750 million 10 year bonds in 2007 (Stuart, 2008). Again, through an Act of Parliament the Ghana Education Trust Fund (GETFund) was established in August 2000 to help in financing educational infrastructure among others.

In general, tools for innovative financing of infrastructure are designed to increase the amount of fiscal space within government budgets by increasing the amount of financial resources available for infrastructure (Ploeg and Casey, 2006). As mentioned by the authors Cohen (2002) and Ploeg and Casey (2006) innovative financing of infrastructure is relative with respect to geography and

time. Across the breadth of the literature studied, correlations are that challenges and success factors with regard to innovative financing of infrastructure are also relative within the context of location and time (US Federal Highway Administration, 2004; Cardone and Fonseca, 2006; Ploeg and Casey, 2006; Ketkar, 2009). This suggests that conclusions drawn elsewhere cannot be applied directly in another country. Thus, it is imperative to identify the challenges of innovative financing options available to Ghana, and analyse the strategic issues of innovative financing of infrastructure in Ghana.

1.2 PROBLEM STATEMENT

Infrastructure deficit continues to be a contending problem facing many countries the world over, especially developing countries (UNECF, 2008). Africa counts among its development challenges a major infrastructure deficit, with large investment needs and an associated financing gap (Foster, et al., 2009). This is evidenced by congested roads, poorly-maintained recreational facilities, deteriorated schools, hospitals, and water and water treatment systems, and other infrastructure assets which are either non-existent or in deplorable conditions (UNECF, 2008).

In Ghana, the problem has been aggravated owing to rapid urbanization (The World Bank, 2002), a growing population growth, and shortfalls in fulfilment of pledges from development partners – sometimes due to counterpart finance on the Ghanaian side falling well short of expectations (The World Bank, 2002). Again, financial institutions in Ghana currently provide high interest and short tenor loans which are typically not suitable for infrastructure financing. Also, the impact of recent financial turmoil on the infrastructure market has been significant. Capital flows to developing countries have dropped by half (Thunell, 2009). Meanwhile, much

of the vast amounts of capital needed to finance infrastructure projects in Ghana still come from international or foreign public institutions (Caspary, 2009). In the educational sector of Ghana policies such as the Free, Compulsory, Universal, Basic, Education (FCUBE), school feeding programme, and the recent reforms have all compounded the problem. The need for new policy tools and approaches to financing, funding and delivering infrastructure projects is obviously evident. Ghana has not been completely idle in terms of innovation in infrastructure financing, for example the introduction of the GETFund, the US\$ 750 million 10 year bonds issued in 2007, and the recent interest in PPP, are all innovative attempts but efforts to date are insufficient to meet the challenges (Ghana Investment Promotion Council (GIPC), 2002), for example, children still have classes under trees a decade after the introduction of the GETFund. The continuing difficulty in finding the necessary financing and funding resources to build and maintain infrastructure assets encourages further studies in alternative financing options. Hence, the decision to undertake the research into issues of strategic importance in innovative financing of infrastructure projects in Ghana. It is envisaged that, a thorough understanding of the strategic issues surrounding innovative financing of infrastructure projects will be essential, particularly during periods of economic recession. Also, lessons from this study is expected to benefit project managers immensely since a knowledge of the client's sources and nature of finance is key in drafting and managing contracts.

1.3 RESEARCH AIM

The primary aim of this study is to identify and analyze the strategic issues of using innovative financing for infrastructure projects delivery in Ghana in order to prescribe policy directions for improvement.

1.4 RESEARCH OBJECTIVES

In order to achieve the stated aim, the following specific objectives were set:

1. To conduct a critical literature review on the conceptual underpinnings of innovative financing of infrastructure projects delivery
2. To identify the challenges of innovative financing of infrastructure projects delivery in Ghana
3. To identify and analyse the strategic issues that influence innovative financing of infrastructure projects delivery in Ghana
4. To prescribe and describe policy guidelines for the improvement of innovative financing of infrastructure projects in Ghana

1.5 RESEARCH QUESTIONS

The following research questions were articulated based on the identified theoretical gaps to fulfil the stated aims and objectives of the study:

1. What are the conceptual underpinnings of innovative financing of infrastructure?
2. What are the challenges of innovative financing of infrastructure project delivery in Ghana?
3. What are the strategic issues of using innovative financing for infrastructure project delivery in Ghana?
4. What are the possible recommendations for effective application of innovative financing options in Ghana?

1.6 SCOPE OF THE STUDY

The research is focused on the public sector financing of infrastructure projects including institutions involved in innovative financing of infrastructure such as the GETFund, and the Road Fund. Geographically the research was in the Greater Accra (interviews) and Ashanti (survey) Regions. The Greater Accra Region was chosen for the reason that institutions involved in the financing of infrastructure projects in Ghana have their head offices located in the capital city-Accra. The Ashanti region was chosen to represent the local governance front since it is the region with the largest number of metropolitan, municipal and district assemblies (which are also involved in the provision of infrastructure). The study involved mainly stakeholders in the public sector in the identification and analysis of the strategic issues concerning the financing of infrastructure projects with innovative techniques.

1.7 RESEARCH METHODOLOGY

The research methodology involved the systemic rules and procedures upon which this research agenda was based and against which the data collected was interpreted and the findings evaluated. An appropriate philosophical position was adopted to help in addressing the key research questions identified in section 1.5, since such philosophical issues of ontology, epistemology, axiology, and methodology shape the choice of research instruments (Christou, et al., 2008). An extensive literature review was conducted to help provide a thorough understanding of innovative financing of infrastructure. The review was supported by in-depth exploratory interviews to verify the strategic issues identified in the literature and explore new areas which might not have been given expanded view in literature. Triangulation involving qualitative and quantitative research strategies was adopted to elicit the relevant data from the

research participants. The qualitative aspect of the study dealt with the exploratory interviews which helped in the identification of the strategic issues in innovative financing of infrastructure projects in the Ghanaian context. Subsequently, a self-administered structured survey questionnaire was conducted to collect primary data from the field. The results obtained from the literature review and the in-depth interviews provided the framework and the basis for the development of the questionnaire.

Non-parametric statistical method involving chi-square (χ^2) testing was adopted in analysing the data. The chi-square (χ^2) method was adopted because it was anticipated that the kinds of data to be derived from the survey were likely to be mostly nominal and ordinal data. The method was also adopted in testing the findings because of inadequate knowledge of the nature of the distribution of the population. To further analyze interrelationships among the large number of the strategic issues identified and to explain these issues in terms of their common underlying dimensions, factor analysis was employed.

1.8 SIGNIFICANCE OF THE STUDY

Ghana being a developing country is faced with a major constraint to the provision of infrastructure in the form of financing and funding. Whilst the World Bank and other international organizations have been advocating the need to domestically mobilise funds for infrastructure projects in order to reduce the debt burden (Dirie, 2005), the central government has also been urging local government authorities not to over rely on their shares of the common fund but to be innovative in their revenue mobilisation drives in order to generate enough resources for developmental projects. For instance, a strategy adopted for encouraging the

metropolitan, municipal and district assemblies (MMDAs) to increase their internally generated funds (IGFs) is by way of increasing the margins of the common fund for those with high IGFs. Thus it is anticipated that lessons drawn from the research will help immensely in the search for alternative ways to finance infrastructure projects.

1.9 ORGANIZATION OF THE RESEARCH

The thesis is divided into seven (7) independent but interrelated chapters. Chapter One contains the general introduction and background to the research. The problem has been presented and the need for the research justified. The research aim, objectives, and scope have also been presented, and the research questions formulated. The literature review is dealt with in chapters Two, Three, and Four. The challenge of the review was the establishment of the conceptual underpinnings regarding innovative financing of infrastructure. Chapter Five covers the discussions of the methodology adopted for the study. Chapter Six is for the empirical analysis of data from the field. Chapter Seven wraps up the research by reviewing the main contributions of the research to knowledge. A provision is made for summary of the research results. Avenues for further research are identified. Policy recommendations and limitations of the study are also outlined.

1.10 SUMMARY OF CHAPTER

As noted in the previous section this chapter discussed the general introduction and background to the research. The problem statement was also presented and the need for the research justified. The chapter also introduced the research aim, objectives, and the scope of the study. To arrive at the objectives of the study the research questions were formulated and a summary of the methodology adopted for the study was also presented in the chapter. Chapter one was concluded

with discussions on the significance of the study and the organization of the research. The next chapter which begins the literature review discusses working definitions of infrastructure and innovative financing of infrastructure projects delivery, as well as general background discussions on the subject.

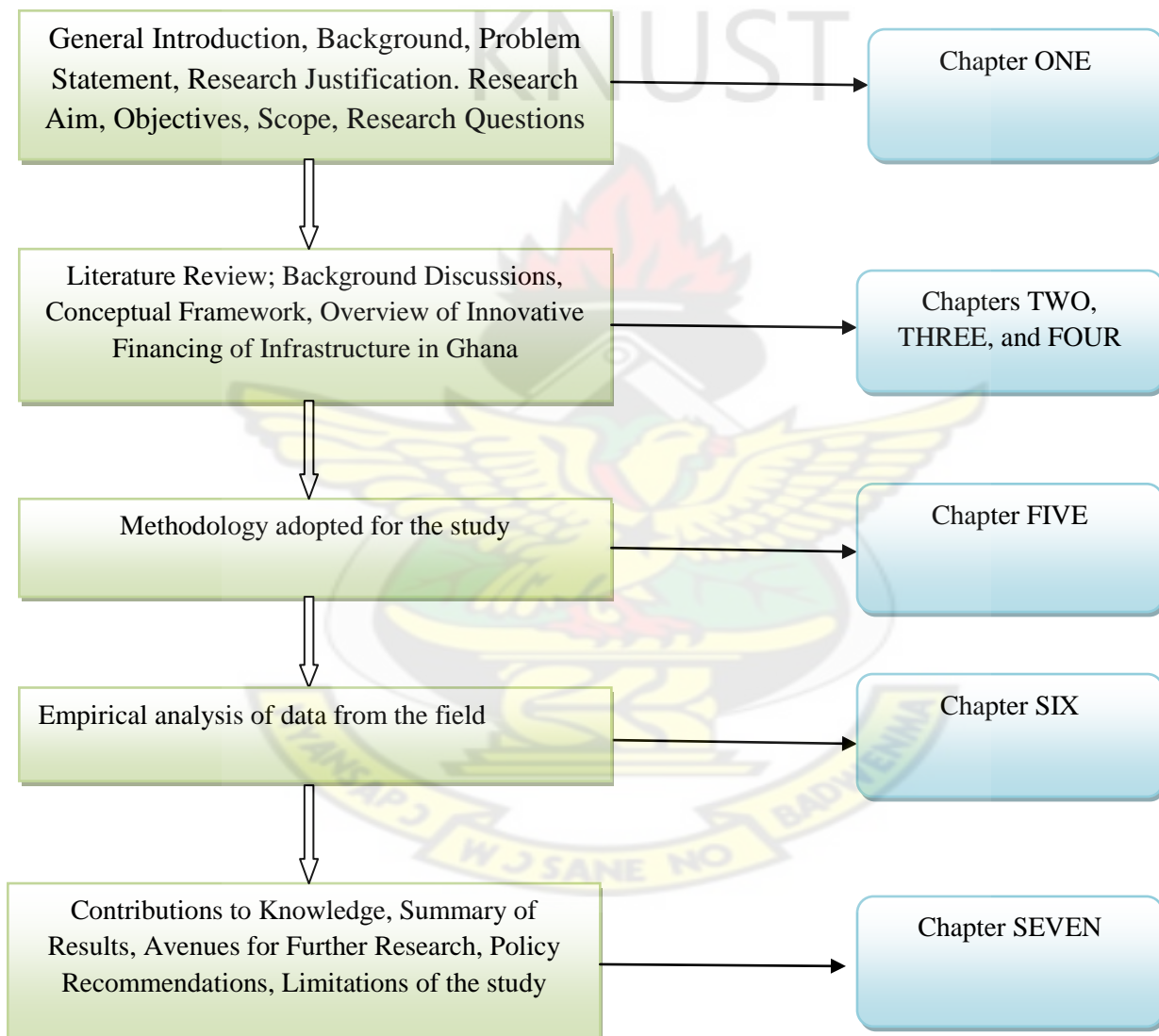


Figure 1.1 Flow diagram of research process.

CHAPTER TWO

WORKING DEFINITION OF INFRASTRUCTURE AND INNOVATIVE FINANCING OF INFRASTRUCTURE PROJECTS

2.0 INTRODUCTION

In chapter one the general introduction and background to the research was discussed, including the problem statement, research justification, research aims and objectives, scope, research questions, and the research methodology. This chapter begins the critical review of pertinent literature in innovative financing of infrastructure project delivery. The chapter starts with discussions on a working definition of the term infrastructure. This is then followed by discussions on innovations in financing of infrastructure projects delivery. The works of Dirie (2005), Kumar, et al. (2006), Ploeg and Casey (2006), Foster (2008, 2009), Platz (2009), Sihombing (2009), and other influential papers and reports from the World Bank and the US Federal Highway Administration informed the review which provides the conceptual/theoretical basis of this research.

2.1 DEFINITION OF INFRASTRUCTURE

The term infrastructure has been used since 1927 to refer collectively to the roads, bridges, rail lines and similar public works that are required for an industrial economy to function (Moteff, et al., 2003). Over the period, many definitions have been originated by different researchers including Sheffrin (2003), Moteff et al. (2003), Semler (2005), Cleveland (2008), Chism (2009), and Woonchong (2009). Recent work by Sheffrin (2003) defined infrastructure as the services and facilities necessary for an economy to function. According to Woonchong (2009), infrastructure is

most often used to describe large structures made of concrete and steel, such as power plants, roads, water supply systems, and, increasingly, information and communications systems. Woochong (2009) argued that these parts of the built environment underpin a country's economic potential and in today's world, no country can expect to succeed without a solid infrastructure base.

Central to the infrastructure debate, it is clear that infrastructure provides the basic facilities, services, and installations required for a community or society to function. Cleaveland (2008) joined the debate with the scope of infrastructure as including facilities such as transportation and communications systems, water and power lines, structures to house public institutions including schools, post offices, and so on. According to Cleaveland (2008), infrastructure provides the interface between people and the planet, and that for society to advance much beyond the very basic agrarian lifestyle, infrastructure remains inevitable. Finally, Chism (2009) defined infrastructure as the physical structures that provide or permit transportation; energy generation and transmission; water distribution and sewage collection; and the provision of social services such as health and education. Chism further argued that infrastructure underpins the quality of life as well as the ability of economies to function effectively.

2.2 TYPES OF INFRASTRUCTURE

With no standard or agreed definition, the concept in policy terms has been fluid, as it appears to be, including both public and private systems, services, and even amenities, and broadly such social facilities (as schools, hospitals, and prisons), and it often includes industrial capacity, as well (Moteff et al., 2003). Various types of infrastructure such as transport (e.g. roads, railways,

ports and airports), public utilities (e.g. electricity and water supply), public services (e.g. fire service, flood protection, police), national services (e.g. the defence, monetary and postal systems and the legal and regulatory system) energy (generation and transmission), communications (cable, television, fiber, mobile and satellite), agriculture (irrigation, processing and warehousing), and financial services, along with “soft infrastructure,” which denotes institutions that maintain the health and cultural standards of the population (e.g. public education, health and social welfare) have been identified by researchers including (Cohen (2002), D’Amour (2002), Atkinson, (2003), Moteff et al. (2003), Semler (2005), Stein and Castillo (2005), Cardone and Fonseca (2006), Mor and Schrawat (2006), Wachs (2006), Nichol (2007), Andris (2008), Cleavland (2008), Herfindahl and Treat (2009), Ketkar and Ratha (2009), Nicolosi (2009), Platz (2009), Sagar (2009), and Slone (2009).

The term infrastructure has also been used to describe the basic architecture of any system; mechanical, social, political or cultural (Nicolosi, 2009). There is a further broadening of the meaning of the word. The term is often used very abstractly. For instance, software engineering tools are sometimes described as part of infrastructure. In economics, the term “infrastructural capital” at times includes skilled manpower Cleavland (2008). The review of the literature suggested that two other terms are usually associated with infrastructure. The first is infrastructure services, such as transport, energy and water. The second is the stock of infrastructure assets which produce the flow of services. This study deals mainly with the financing of the infrastructure assets (such as electricity-generating plants) and not infrastructure services (such as the flow of electricity). Given the scope of infrastructure and the central

importance of infrastructure to society at large, infrastructure is necessarily a central factor in achieving our sustainability objectives (Cleaveland, 2008).

2.3 ROLE OF INFRASTRUCTURE IN NATIONAL DEVELOPMENT.

A review of the works of various researchers (see for instance Dirie (2005), Kumar, et al. (2006), Cleaveland (2008), Foster (2008, 2009), Ketkar and Ratha (2009), Nicolosi (2009), Platz (2009), Sagar (2009), and Slone (2009), indicated that infrastructure plays important roles in society to the extent that a lack of infrastructure facilities is considered to be a major structural weakness which holds back economic growth and development. Consistent with other reports, infrastructure assets are central to household life and economic production; and it is often said that infrastructure can be considered, if not the engine, then the “wheels” of economic growth (Estache, 2004). Estache (2004) further argued that infrastructure helps to spread the benefits of growth, which makes the development process more inclusive.

A large volume of research studies also makes it clear that the availability of good quality physical infrastructure improves the climate for foreign direct investment (FDI) by reducing the “cost of total investment” incurred by foreign investors and thus raising the rate of return (Estache, 2004). Hence it is argued that government spending on infrastructure should continue during periods of fiscal adjustment because such outlays, more than any other form of public investment, complement private investment and portend economic development in the long-term. Indeed, studies conducted by the World Bank show that public investment in basic infrastructure not only increases productivity but also promotes private investment in the medium- to long-term (Chang, 1999).

Again, according to Foster (2008), infrastructure has played a significant role in Africa's recent economic turnaround and will need to play an even greater role if the continent's development targets are to be reached. Estache (2004) argued that, in addition to infrastructure supporting higher economic growth infrastructure also strengthens the sharing of the benefits of growth. Thus the development of infrastructure needs to be sustained to support future economic growth, poverty reduction in general, and achieving the millennium development goals (MDGs) in particular (Calderon, 2008; Foster, 2008). Many researchers have discussed the importance of infrastructure development in achieving the MDGs. Overall findings show that infrastructure projects deliver high economic and social returns. Economic returns on investment projects average over 30 to 40 per cent for telecommunications and more than 200 per cent for roads (Estache, 2004).

2.4 CHARACTERISTICS OF INFRASTRUCTURE

It has been mentioned that the key characteristics of infrastructure are critical to determining the applicability of a particular innovative financing tool (Ploeg and Casey, 2006). Before deciding how best to finance an infrastructure asset, its basic characteristics need to be identified (Mor and Sehrawat, 2006). The review of the studies by Cohen (2002), Mor and Sehrawat (2006), Cleaveland (2008), Ketkar and Ratha (2009), Nicolosi (2009), Platz (2009), Sagar (2009), and Slone (2009) indicated that infrastructure projects differ in some very significant ways from manufacturing projects and expansion and modernisation projects undertaken by companies. Also from the viewpoint expressed by the researchers Moteff, et al (2003), Mor and Sehrawat (2006), and Cleaveland (2008), infrastructure can be classified based on its key characteristics such as: size, complexity, up-front costs, construction time, asset life, future commitments,

payback period, marketability, priority, new construction or refurbishment, integrated or stand alone project, hard or soft asset, user profile, coverage, risk level, rates of return, and location specific. As mentioned earlier in the first sentence of this section understanding the implications of these characteristics, is key to the selection of the right financing tool from the infrastructure finance tools including: user fees, bond markets, domestic taxes, equity, grants, direct private investment, loans, mixed credits and export funds, micro-credit/micro-finance, voluntary finance scheme, environmental charges, dedicated or special purpose fund, debt swaps (Cardone and Fonseca, 2006)

2.5 APPROACHES TO PROVISION OF INFRASTRUCTURE

Before proceeding to innovative financing of infrastructure it is appropriate to discuss the approaches to the provision of infrastructure which includes the financing, funding and delivery of the infrastructure asset (Cohen, 2002). Ploeg and Casey (2006) argued that, two basic methods are involved in each aspect of the three approaches to provision of infrastructure (financing, funding and delivery), and that this triple-two rule is a useful frame for any discussion of innovative financing of infrastructure. However, it can be deduced from other works by US Federal Highway Administration (2002), Cohen (2002), Cardone and Fonseca (2006), and Platz (2009) that infrastructure financing should not be limited to payment from accumulated resources and debt financing but should include equity financing which is sometimes used in situations where infrastructure is delivered privately or through public-private partnership arrangements. The financing, funding, and delivery of infrastructure are explained next.

2.5.1 Financing infrastructure

The review of the work of researchers including the US Federal Highway Administration (2002), Cohen (2002), Semler (2005), Cardone and Fonseca (2006), and Platz (2009) indicated that financing of infrastructure has to do with how providers raise funds for capital investments in infrastructure. Indeed as Ploeg and Casey (2006) put it, the financing of infrastructure refers to how the up-front capital for constructing a new asset, or renewing, rehabilitating or reconstructing an existing asset, is secured. The methods available include: 1) debt financing or 2) on a pay-as-you-go basis where the government covers the up-front costs through current revenues or savings or 3) through equity finance.

2.5.2 Funding infrastructure

The funding of infrastructure according to Ploeg and Casey (2006) refers to how the up-front capital costs are repaid or recovered. The methods available according to Ploeg and Casey (2006) include; general tax revenue and user fees on infrastructure usage. Funding can be provided through a combination of the two options, but taxes (or general revenue) and user fees remain the only two basic methods.

2.5.3 Delivering infrastructure

As with funding, the literature review indicated that there are only two methods for delivering infrastructure: 1) the public sector can do it (the traditional approach currently used for most infrastructure); or 2) the private sector can do it (see for instance US Federal Highway Administration (2002) and Cohen (2002)).

With the application of all forms of infrastructure finance, the specific circumstances and goals of the infrastructure project in question must be identified and carefully considered before making a decision about which specific approach to take. While there are a limited number of methods, there are a multitude of tools that can be used within each particular method (Ploeg and Casey, 2006), and this leads to the objective of the study – innovative financing of infrastructure.

2.6 CLASSIFICATION OF INFRASTRUCTURE ON FINANCING APPROACH

Infrastructure assets are classified by researchers including US Federal Highway Administration (2002), Ploeg and Casey (2006, 2008), and Sihombing (2009) into three types depending on how they are financed and funded. To this end, the three types of infrastructure as gathered from the literature review are tax supported infrastructure, self-financing infrastructure and quasi-commercial or blended infrastructure, and these are presented below:

2.6.1 Tax supported infrastructure

This type of infrastructure asset is entirely supported by general taxation because according to the researchers they do not generate revenues and include such assets as open access parks and urban road networks that are not priced to individual users, but supported wholly by taxation.

2.6.2 Self-financing infrastructure

Self-financing infrastructure is commercial, marketable, or enterprise infrastructure (US Federal Highway Administration, 2002). This type of infrastructure is provided on a user-pay basis. The fees generated by the infrastructure are sufficient to cover the up-front capital costs as well as the

operation, maintenance, and eventual renewal, rehabilitation and replacement of the asset (Cohen, 2002).

2.6.3 Quasi-commercial or blended infrastructure

The provision of this type of infrastructure from the review involves the combination of the tax supported and self-financing approaches, using both taxation and user pay as a source of funding (see for instance Sihombing (2009). User fees are charged to individuals in an attempt to recover a portion of the capital, maintenance, and operational costs of the asset, but the amounts charged are insufficient to cover all of the costs of the infrastructure or its ongoing operation. Thus, a tax subsidy is provided (US Federal Highway Administration, 2002).

2.7 EVOLUTION OF INFRASTRUCTURE FINANCING

Owing to the characteristics of infrastructure assets and the perceived importance of infrastructure in economic development, infrastructures has traditionally been publicly financed throughout the years, and even with the advent of concept of innovative financing traditional forms of public funding and procurement continue to dominate the infrastructure market (Abadie, 2008). Given the important relationships between infrastructure and the economy, including income distribution implications as mentioned in the previous section, African governments have been reluctant to relinquish control over the infrastructure sector of their economies (Chang, 1999).

However, financial difficulties and the inability of African countries to overcome the economic down-draft of the debt crisis of the 1980s necessitated the development and involvement of the private sector in the provision of infrastructure. For instance, Chang (1999), the World Bank

(2002), Abadie (2008), and Foster (2008) argued that, the 1980s and early 1990s were characterized by economic reforms that focused on the reduction in the role of government in the economy. In developing countries, economic reform meant significant reduction in the ownership of enterprises that were brought under state control after achieving political independence (Chang, 1999). Moreover, in this effort African countries found multilateral and bilateral donors willing collaborators, even to the point of offering substantial debt forgiveness condition on evidence of a market-oriented economy (World Bank, 2002). Furthermore, because of the mutually reinforcing characteristics of external assistance and internal reforms, African countries have become more comfortable with the process and have done more to privatize their infrastructure sectors since 1995 than in the decade prior (Chang, 1999).

The approach of African countries to privatization has meant that public finance remains the dominant source of finance for infrastructure with the exception of telecommunication (Chang, 1999). Public investment is largely tax-financed and executed through central government budgets, while operating and maintenance expenditure is largely financed from user charges and executed via state-owned enterprises (Foster, 2008). Traditional forms of government public funding and procurement continue to dominate the infrastructure market (Abadie, 2008).

2.8 INNOVATIVE FINANCING OF INFRASTRUCTURE

While the concept of innovative financing of infrastructure has become popular in the infrastructure policy, attempts at a formal definition are rare and inadequate (Ploeg and Casey, 2006). In this work, the definition developed by the US Federal Highway Administration has been used.

Accordingly, innovative financing of infrastructure has been broadly defined to include a number of tools that supplement traditional sources and methods of financing to overcome cash flow shortages and attract new sources of capital (US Federal Highway Administration, 2004).

Traditionally, innovative financing of infrastructure endeavours efforts to identify creative ways for governments to create additional fiscal space within their budgets (Heller, 2004 and 2005). Thus, the concept speaks to a wide range of public finance issues including the reform of government service delivery, new tax tools, and public-private partnerships. The concept of innovative finance has thus emerged to consider alternatives, both in terms of expanding the notion of who can provide finance as well as how finance can be supplied and demanded. With innovative finance, the range of possible stakeholders moves well beyond development agencies and central governments, and can include national NGOs, local banks or financial intermediaries, sub-sovereign governments, and users, as well as donors and International Finance Institutions (Cardone and Fonseca, 2006). While many of these techniques may not be new to other sectors, their application to a particular sector may make them innovative. To this end the US Federal Highway Administration (2004), Cardone and Fonseca (2006), Nichol (2007) and Ketkar (2009), have all argued that innovative financing is relative with respect to time, geography and the type of project. Thus Ketkar (2009) argued that the whole idea of innovative financing is flexible and evolving. Innovative financing is a method of infrastructure financing that does not rely on the single strategy of grant reimbursement. Innovative financing promotes a diversified approach providing options for financing from the private and public sectors (Crockatt and Barry, 2004). In a recent presentation Cohen (2010) argued that innovative financing methods are not really “innovative”, instead, this refers to alternative delivery methods where some form of private

capital is involved. Cohen (2010) further argued that innovative financing of infrastructure refers to the combination of private financing and public funding in which the financial mechanisms are bundled to deliver projects more timely, efficiently, and on value for money basis.

2.9 THE NEED FOR INNOVATIVE FINANCING OF INFRASTRUCTURE

Adequate, efficient and well-maintained infrastructure is one of the key components of a viable, prosperous economy, and a significant determinant of quality of life, as noted earlier. Anchored by the works of US Federal Highway Administration (2002), Cohen (2002), Cardone and Fonseca (2006), Ploeg and Casey (2006), Foste (2008), and Platz (2009), it is quite easy to mention that as competition for scarce resources at all levels of government increases, infrastructure upgrades and expansion are becoming increasingly difficult to finance. The drivers for infrastructure investment may vary from country to country but demand continues to rise (Foster, 2008). While the world's developed economies such as the UK and the US are facing the need for significant investment to upgrade or replace ageing infrastructure, emerging economies such as India, and developing countries like Ghana are aggressively focussing on building new infrastructure to facilitate economic growth and prosperity (Abadie, 2008). The Organization for Economic Cooperation and Development (OECD) estimates that the required investment in road, rail, telecoms, electricity and water infrastructure will reach US\$71 trillion by 2030, without even taking into account seaports, airports and social infrastructure; this represents approximately 3.5% of global GDP to 2030 (Abadie, 2008). The growing demand for infrastructure worldwide, in both developed and emerging economies, continues to put intense pressure on public budgets, especially in countries with fiscal deficits (Foster, 2008).

Current receipts, savings, and central government transfers have proven to be insufficient to fund large-scale projects in most developing countries, including Ghana (World Bank, 2008). Infrastructure funding gaps in developing economies are staggering. According to World Bank (2008) and Platz (2009), Africa faces an infrastructure financing gap of US\$35 billion per year. For Asia, it is estimated that the total infrastructure financing gap averaged around US\$420 billion per year over the period of 2006-2015 (Platz, 2009). Earlier, Fahrholz (2001) had argued that the infrastructure financing needs of developing countries alone are going to run into the trillions of dollars over the next few decades and public institutions alone simply would not be able to pick up the tab. In the meantime, infrastructure has to be upgraded constantly to ensure sustainable, long-term economic growth. To compete, developing countries must build a competitive infrastructure in a matter of years. Yet, financing infrastructure investments has always proved to be a challenge (Sihombing, 2009).

The world financial system over the past fifty years reflected a clever solution to this difficult problem. It appeared in the form of quasi-public agencies that were charged with becoming the banks for infrastructure investment in developing countries. More recently, however, limitations in this system have become apparent (Sihombing, 2009). The amount of infrastructure financing these international financial institutions can provide is far below current needs, and unlikely to catch up very soon (Sihombing, 2009). Developing countries including Ghana, simply cannot rely upon these institutions alone to help pay for necessary investments in infrastructure.

Across the globe, governments are increasingly turning to the private sector to fund critical infrastructure developments (Platz, 2009). However, at this time that governments are faced with

financial constraints, and are increasingly turning to the private sector to meet the infrastructure funding gap, the financial markets are in turmoil due to the credit crunch. The outlook in the near future according to Abadie (2008), is not too encouraging. Nevertheless, the long term viability of the infrastructure finance market is reliant on the return of institutional debt markets. Bank debt is simply insufficient and inefficient as a source of long term finance (Abadie, 2008).

The infrastructure financing gap can only be addressed by raising additional finance, or alternatively adopting lower cost technologies or less ambitious targets for infrastructure development (Foster, 2008). Dirie (2005) asserted that financial resources are always likely to be tight, consequently, to really contribute to closing the gap, the financing sources particularly official development assistance (ODA) would need to shift their focus (Foster, 2008). With regard to public finance, the scope for raising additional tax finance and moreover the political will to allocate this toward infrastructure appears more limited. The fragile states (oil importing countries), in particular, where the gaps are largest also have the least potential to tap into domestic finance (Foster, 2008).

Sub-Saharan Africa has attracted only a small share of the private investment in infrastructure in developing countries, and that share has been heavily tilted toward telecommunications (Leigland and Butterfield, 2006). One reason for this is its difficulties in getting project finance (Sheppard, et al., 2006) cited in Foster (2008). According to Platz (2009), the private sector's investment in infrastructure projects in developing countries over the last 10 years (with telecoms excluded), declined in the two poorest regions (East Asia and Pacific and Sub-Saharan Africa) over the period from 1990 to 2007 (World Bank, 2008). Most forecasters expect a

downward trend due to the current financial and economic crisis. Moreover, the private sector's focus on profitability has come with social and political costs since it has often led to tariff increases in sensitive sectors like water with adverse effect on the poorest segments of the population (Platz, 2009).

The current global financial and economic crisis has generated renewed interest in mechanisms that help limit country exposure to volatile international financial flows and currency movements (Platz, 2009). Clearly, to create a more efficient and encourage the growth of infrastructure investment market, infrastructure financing needs a financial innovation (Sihombing, 2009). On just about every measure of infrastructure coverage African countries lag behind their peers in other parts of the developing world (Foster, 2008; Yepes, et al., 2008). The cost of redressing Africa's infrastructure deficit is estimated at US\$38 billion of investment per year, and a further US\$37 billion per year in operations and maintenance; an overall price tag of US\$75 billion (Briceño-Garmendia, 2008) cited in Foster (2008). The U.S. International Trade Commission (2009) also justified the need for innovative financing of infrastructure in Sub Saharan Africa by arguing that the resultant improvement in infrastructure will increase the export competitiveness of these nations.

Clearly, from the above discussions: increasing demand for limited government resources due to growing infrastructure gap; limitations of banks for infrastructure investment; difficulties in getting private sector finance due to the effects of the credit crunch on the financial market and the limitations of bank debt; the impossibility of raising additional revenue from increasing taxation and the skewed nature of funds from major external sources; difficulties in getting

project finance and the private sector's focus on profitability, points to the need for innovative methods in infrastructure financing.

2.10 OBJECTIVES OF INNOVATIVE FINANCING OF INFRASTRUCTURE

Many researchers including those pioneered by US Federal Highway Administration (2002 & 2004), Ploeg and Casey (2006 & 2008), Mor and Sehrawat (2006), Nichol (2007), Slone (2008), and Moszoro (2009) have discussed the strategic objectives of innovative financing of infrastructure. These authors described the strategic objectives of innovative financing in terms of: increased revenue; improved cash flow; multiple policy objectives; economic sustainability; accountability; and appropriate matching of financing tools. A summary of these objectives as presented by these authors are discussed in the subsequent sections.

2.10.1 Increased revenue

Innovative financing of infrastructure seeks to grow the pool of resources available for infrastructure by increasing the revenue yield of traditional or existing finance tools or securing funds at the lowest possible cost (US Federal Highway Administration, 2004). This is typically accomplished by changing the way these tools are used, and thus overcoming certain political challenges or barriers to their increased usage (Ploeg and Casey, 2006). The review of the literature indicated that innovative financing of infrastructure also attempts to make more efficient use of existing sources of revenue by leveraging external revenue sources such as grants. Accordingly, innovative financing of infrastructure seeks out new avenues of funding to supplement the existing basket of infrastructure financing sources (US Federal Highway Administration, 2004; Mor and Sehrawat, 2006; Slone, 2008; Moszoro 2009). Thus the overall

aim of innovative financing of infrastructure from the perspective of revenue is to increase the fiscal space within the capital budget envelope by securing additional revenue while maintaining overall fiscal discipline (Nichol, 2007).

2.10.2 Improved cash flow

Innovative financing of infrastructure tools place a premium on flexibility in an attempt to provide better up-front funding for infrastructure projects, overcome problematic and recurring short-term cash flow shortages, and improve long-term cash flow performance and management (US Federal Highway Administration, 2004; Cardone and Fonseca, 2006; Nichol, 2007). In this context, the aim of innovative financing of infrastructure is to improve overall cash flows, but not necessarily increase the total available funding. Better cash flow management, for example, can accelerate the implementation of infrastructure projects that are blocked by a lack of funds in the short-term (US Federal Highway Administration, 2004).

2.10.3 Multiple policy objectives

An important, yet often overlooked, objective of innovative financing of infrastructure is how certain tools provide additional funds while also serving other policy objectives (Ploeg and Casey, 2006). For example, some tools help reduce the demand for infrastructure as well helping to finance or fund an increase in the supply of infrastructure. According to (US Federal Highway Administration, 2004), innovative financing of infrastructure can help promote environmental conservation, reduce urban sprawl, and ensure better fairness and equity in the provision of services. A typical example in this situation is the Community-Led Infrastructure Finance Facility (CLIFF) (World Bank, 2002)

2.10.4 Economic sustainability

The review of literature has shown that innovative financing of infrastructure is also very much about economically sustainable solutions to infrastructure issues (Slone, 2008). For example, the review of the works of (Atkinson, 2003; US Federal Highway Administration, 2004; Cardone and Fonseca, 2006; Ketkar, 2009) indicated that some tools are better geared toward managing the costs of capital assets across their whole life cycle, ensuring adequate financing and funding over the long-term (including preventative maintenance). In this sense, innovative financing of infrastructure can be seen as a complement to an overall capital asset management strategy that focuses on the long-term as opposed to the short-term (Ploeg and Casey, 2006). Examples include innovative financing and funding tools that promote the self-funding of infrastructure through user pay systems and comprehensive pricing and tariff structures as opposed to the traditional tax and spend option (Nichol, 2007). The greater the degree to which a financial tool allocates the costs of infrastructure among its various users, and the greater the degree to which it establishes a link between those who benefit from the infrastructure and those who pay for it, the more sustainable infrastructure investments will become (Ploeg and Casey, 2006).

2.10.5 Accountability, transparency, and enhanced service

A key goal of innovative financing of infrastructure is better public oversight, accountability, visibility, and transparency in the financing, funding and delivery of public infrastructure, as well as its future performance (Mor and Sehrawat, 2006; Slone, 2008; Moszoro, 2009;). As part of this general thrust, many tools are geared toward providing governments with a feedback mechanism that improves their ability to respond to changes in demand and to determine how and when to provide infrastructure (Mor and Sehrawat, 2006)

2.11 CHAPTER SUMMARY

This chapter began with discussions on a working definition of infrastructure and innovative financing of infrastructure. The discussions were centred on such topics as types, characteristics, and role of infrastructure in national development. The chapter also discussed the approaches to provision of infrastructure, and extended the discussion to cover the need for innovative financing of infrastructure, before finally concluding with discussions on the strategic objectives of innovative financing of infrastructure projects. The next chapter discusses the conceptual framework of innovative financing of infrastructure projects delivery.



CHAPTER THREE

CONCEPTUAL FRAMEWORK OF INNOVATIVE FINANCING OF INFRASTRUCTURE

3.0 INTRODUCTION

The previous chapter captured background discussions on innovative financing of infrastructure with the review of the works of Dirie (2005), Kumar, et al. (2006), Ploeg and Casey (2006), Foster (2008, 2009), Platz (2009), Sihombing (2009), and other influential papers and reports from the World Bank and the US Federal Highway Administration. Chapter three reviews the conceptual framework of innovative financing of infrastructure projects. By reviewing the works of Cohen (2002), Semler (2005), Mor and Sehrawat (2006), Ploeg and Casey (2006, 2008), Nichol (2007), Nicolosi (2009), and Cohen (2010), topics including innovative financing of infrastructure, the concept of innovative financing of infrastructure, and public-private partnerships are discussed.

3.1 INNOVATIONS IN FINANCING OF INFRASTRUCTURE

There are many different paths and innovations including public-private sector partnerships, municipal bonds, direct access to international development agency funds, all of which are increasingly being considered (Dirie, 2005). The review of recent works by Cohen (2002), Semler (2005), Nichol (2007), and Nicolosi (2009), broadly captured innovation under three thematic categories discussed below.

Firstly, innovation occurs when an existing tool is used in a different way (US Federal Highway Administration, 2002 & 2004; Cardone and Fonseca, 2006; Ploeg and Casey, 2006; Ketkar, 2009; Sihombing, 2009). For example, where general taxation is used as a means to service the debt incurred to finance an infrastructure asset an innovative variation of this would be to earmark a portion of the general tax rate to pay for the debt servicing of a major infrastructure project. Earmarking allows taxpayers to better see their tax moneys at work, making it politically easier to raise tax revenues for specific projects (Ploeg and Casey, 2006).

A second type of innovation occurs when an entirely new tool (i.e., one that has not generally been employed before) is employed to finance an infrastructure project (US Federal Highway Administration (2004). As an example in Ghana, the syndicate loan for the financing of the mega hostel project in the University of Ghana in which the university secured the loan with the rental revenue (user fees) as collateral, is a typical example.

Employing familiar methods for financing, funding and delivery, but applying them to different types of infrastructure is also innovation (Nichol, 2007). This particularly robust form of innovation occurs when a basic financing, funding, or delivery method is applied to an infrastructure asset to which it has generally not been applied to in the past (US Federal Highway Administration, 2002). In many ways, this is the heart of innovative financing of infrastructure (Ploeg and Casey, 2006). For example, public-private partnerships are innovative because the private sector is participating in the construction and operation of a public infrastructure asset that has traditionally been the domain of the public sector.

3.2 THE CONCEPT OF INNOVATIVE FINANCING OF INFRASTRUCTURE

As earlier mentioned in section 2.8, the idea of innovative financing of infrastructure is about finding creative ways for governments to create additional fiscal space within their budgets (Heller, 2004 and 2005). To this end various strategies have been proposed. One key to effective use of innovative finance strategies (proposed by the US Federal Highway Administration (2002) and supported by Cohen (2002), is to recognize what kinds of projects can benefit most from which kinds of tools. The researchers argued that it is important to recognise the potential synergy in combining tools to advance a project. The use of this approach is demonstrated in the Figure 3.1

From the demonstration, the base of the pyramid represents the majority of projects that are tax supported because they do not generate revenues, but can benefit from innovative finance tools that enhance flexibility and maximize resources (tax supported infrastructure). Various fund management techniques, such as advance construction, tapered match, and grant-supported debt service, can help to move these projects to construction more quickly (US Federal Highway Administration, 2002). Ploeg and Casey (2006) argued that aside fund management techniques these projects are prime candidates for debt instruments, in which future apportionments are used to pay debt service and other debt related costs.

The mid-section of the pyramid represents those projects that can be at least partially financed with project-related revenues, but may also require some form of public credit assistance to be financially viable (blended infrastructure). A review of the works of the US Federal Highway Administration (2004) and Ploeg and Casey (2006) suggested that the strategy for this category

of projects is the use of various types of assistance in the form of low-interest loans, loan guarantees, and other credit enhancements to national, regional, and local projects. Such credit programmes are designed to assist large-scale projects of regional or national significance that might otherwise be delayed or not constructed at all because of their risk, complexity, or cost (Ploeg and Casey, 2006).

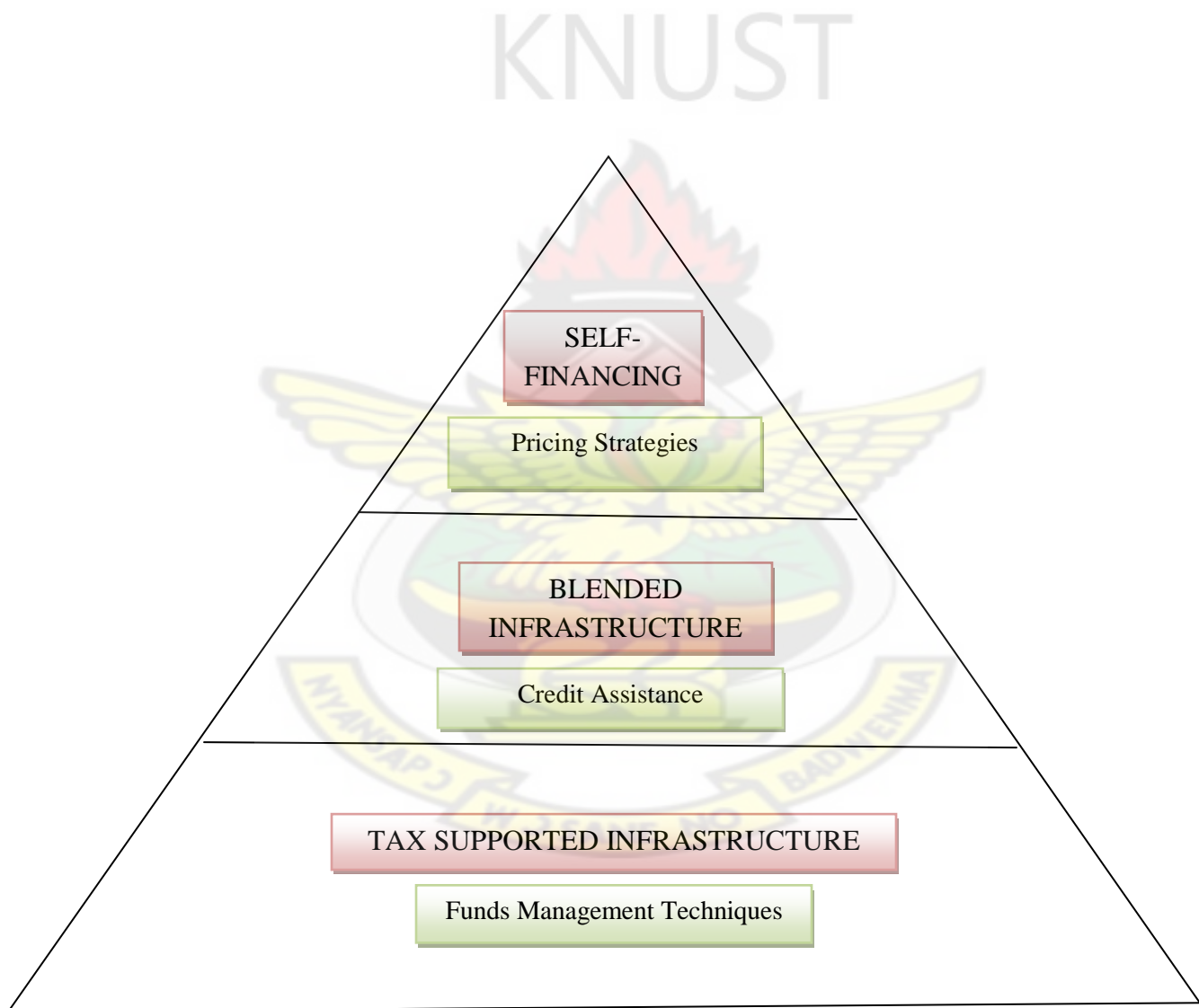


Figure 3.1: Innovative Finance and Infrastructure Categories

Source: Adapted from the US Federal Highway Administration *Innovative Finance Primer*

The peak of the pyramid reflects the very small number of projects that may be able to secure private capital financing without any governmental assistance (self-financing infrastructure). The strategy with this category has been reported to do with appropriate pricing (US Federal Highway Administration, 2004). Indeed, the most innovative options are those designed to intentionally push tax supported infrastructure into the blended or self-financing categories (Ploeg and Casey, 2006). Accordingly, the aim is to convert tax supported infrastructure into a user pay model. This avoids the decision of whether to increase taxes or issue debt to meet infrastructure funding shortfalls (Cohen, 2002).

Related to the above concept is the widely accepted concept, which indicates that a successful application of a particular financing tool largely depends on the key characteristics of the infrastructure in question (US Federal Highway Administration, 2004; Mor and Sehrawat, 2006). As previously noted the key characteristics of infrastructure are critical to determining the applicability of a particular innovative financing tool. Before deciding how best to finance an infrastructure asset, its basic characteristics need to be identified (Mor and Sehrawat, 2006). It can therefore be concluded from the review that infrastructure finance tools must be considered in light of the key characteristics of the infrastructure to which they may be applied. This concept is demonstrated in Figure 3.2.

INFRASTRUCTURE CHARACTERISTICS

DECISION: FINANCING

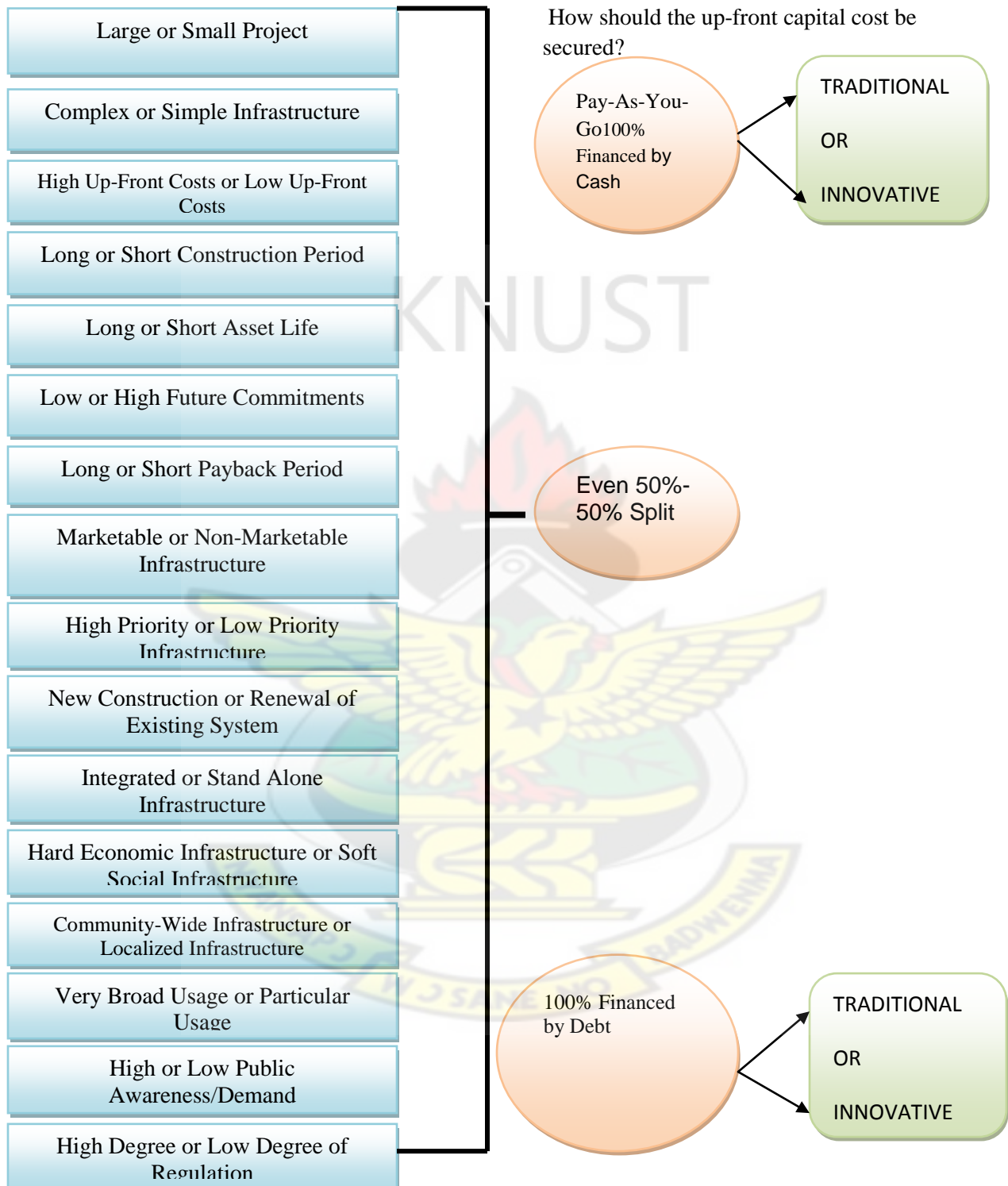


Figure 3.2: The Interface of the Key Characteristics of Infrastructure and the Financing Method.

Source: Adapted from Ploeg, 2006 *New Tools for New Times*

Another strategy embedded in the innovative financing concept is to emphasise the supplementary role of innovative financing based on the idea that financing tools are not mutually exclusive (Atkinson, 2003; US Federal Highway Administration, 2004; Cardone and Fonseca, 2006; Ketkar, 2009). Hence recognizing that the benefits associated with the financing tools are not mutually exclusive and that there is potential synergy in combining tools on a single project is another strategy in innovative financing of infrastructure (Cardone and Fonseca, 2006).

Consequently, innovative finance has been reported to provide an array of tools and institutional arrangements as alternatives or augmentations to traditional funding strategies. These techniques are designed to enhance the effectiveness of fund management and bridge investment gaps between available resources and infrastructure needs (US Federal Highway Administration, 2004). They are intended to maximize the ability of states to leverage future revenues, attract new sources of funds to infrastructure investment, accelerate project completion dates, and more effectively utilize existing funds (Ploeg and Casey, 2006). Often, debt issuance or other forms of credit enhancement have helped facilitate access to a wider range of capital or leverage future revenue streams (US Federal Highway Administration, 2004).

According to Ploeg and Casey (2006), the case for employing innovative financing of infrastructure projects rests upon the arguments that current approaches are insufficient to secure the huge amount of capital required to meet the demand for infrastructure and also that long-term solutions must address the drivers that help create the problems in the first place. Dealing with the second argument involves the use of demand management strategies. These strategies according to Ploeg and Casey (2006), are intended to manage rapidly growing infrastructure

requirements without expanding the supply of infrastructure (keeping the demand for infrastructure in check).

The review of the literature also suggested that the specific circumstances and goals of the infrastructure project in question must be identified and carefully considered before making a decision about which specific approach to take (US Federal Highway Administration, 2004; Cardone and Fonseca, 2006). In particular, innovative financing of infrastructure thrives where the main objective is to provide the right amount of infrastructure at the right cost for those who use it, and to do so through the most effective and efficient means possible, rather than where the primary goal is to redistribute income and ensure universal access at all costs (Ploeg and Casey, 2006).

Finally, it could be gathered from the literature that most of the innovative programs and tools are enabled by legislative changes (National Conference of State Legislatures, 2007). For instance public-private partnerships which have been labeled as innovative way of financing large and complex infrastructure projects (Dixon et al., 2005), are usually enabled by legislative changes. In sum the review of the literature has shown that innovative financing of infrastructure projects revolves around such measures as: new or non-traditional sources of revenue, new financing mechanisms designed to leverage resources, new fund management techniques, demand management techniques, and new institutional arrangements.

3.3 PUBLIC-PRIVATE PARTNERSHIPS AS AN EXAMPLE OF INNOVATIVE FINANCING OF INFRASTRUCTURE

Public-private partnership (PPP) is a contract between a public sector institution and a private party, in which the private party assumes substantial financial, technical and operational risk in the design, financing, building and operation of a project (Farlam, 2005). PPP has also been defined as the combination of a public need with private capability and resources to create a market opportunity through which the public need is met and a profit is made (Heilman and Johnston, 1992). In a public-private partnership, the public sector essentially purchases the costs of providing new infrastructure or the refurbishing of existing infrastructure, bundled with a flow of services, through a long-term financial commitment to a private vendor (Kee and Forrer 2002).

Public-private partnerships incorporate three elements (Ploeg and Casey, 2006 & 2008). First, the risks of bringing infrastructure and services to the public are shared between the public and private sector. Second, the financial rewards of the endeavour are shared. For the public sector, this comes in the form of reduced costs; for the private sector, it comes in the form of a return on investment. Third, the amount of reward expected is related to the amount of risk and responsibility taken on by the public and private sectors. While there is no standard formula, PPP projects usually start with a government decision to build a new infrastructure asset or rehabilitate an existing asset.

Government decides when and where this activity will occur, and sets the specifications for both the quantity and the quality it desires (Townsend, 2005). With relatively small project, the

government usually facilitates the partnership itself by identifying private partners to assist with the design, financing, construction, and operation of the infrastructure (Farlam, 2005). The government then moves from its facilitation role, and becomes the regulator and monitor upon completion of the project. For larger projects, the public and private sectors create a new stand-alone business corporation commonly called a special purpose vehicle or SPV. The sole purpose of the SPV is to carry out the business of the PPP by arranging the design, financing, construction, ownership, and operation of a new infrastructure asset (Ploeg and Casey, 2006 & 2008).

From the works of various authors including Cohen (2002), Semler (2005), Mor and Sehrawat (2006), Ploeg and Casey (2006, 2008) Nichol (2007), and Nicolosi (2009), the concept of the public-private partnership (PPP) tends to dominate discussions of innovative financing of infrastructure. According to Moszoro & Krzyzanowska (2007), public-private partnerships have become an innovative solution to realize the three strategic issues of enhancement of government financing capacities, improvement of public investment efficiency, and the harnessing of consumer-orientated management expertise, all of which are critical in provision of infrastructure services. A public-private partnership is any one of a number of arrangements between a government or public sector body and a private sector party that results in the private sector financing and delivering infrastructure that is traditionally delivered by the public sector alone (Ploeg and Casey, 2006 & 2008).

Public-private partnerships are innovative because the private sector participates in the financing, construction and operation of public infrastructure assets, roles that have traditionally been the

domain of the public sector (see section 3.1). The private party performs a function usually carried out by government, such as maintaining a road (Farlam, 2005). Instead of being the exclusive financier, owner, operator, manager, and provider of public infrastructure, the public role is to facilitate, regulate, and guarantee provision (Porter, 2008). Depending on the infrastructure in view, government will leave the financing, ownership or operation to the private sector in a formalized partnership (Mensah, 2008). The financing is typically securitized by the anticipated revenue the infrastructure will generate as well as the asset itself. Since there is little recourse to the assets of the various corporations or the governments involved, the financing of the infrastructure relies completely on the viability and strength of the project itself (Ploeg and Casey, 2006). In PPP arrangements what is usually financed through debt and pay-as-you-go, funded by taxation and delivered publicly, is normally, completely debt-financed, funded by user fees, and delivered by the private sector (with public oversight). Such approaches according to Ploeg and Casey (2008) constitute the most radical innovation.

In addition to its innovativeness in financing of infrastructure, PPP is acclaimed to come with various benefits including maximization of value-for-money, use of private sector expertise and innovation, appropriate risk transfer, access to increased capital, efficiency gains, delivery of projects on time, delivery of better quality projects, cost effectiveness, performance related payments, competition, and price certainty (Trujillo, et al., 1997; Cohen, 2002; Farlam, 2005; Semler, 2005; Mor and Sehwat, 2006; Ploeg and Casey, 2006; Moszoro & Krzyzanowska, 2007; Mensah, 2008; Porter, 2008; Thay, 2008; Cohen, 2010). The attainment of these benefits according to the researchers is contingent on success factors such as effective monitoring and performance reviews, thorough planning, good communication, strong political commitment,

legal and regulatory framework, tariff sustainability, proper allocation of risk, institutional capacity, accountability and transparency, project selection, competition, realistic expectations, expertise and experience (Trujillo, et al., 1997; Cohen, 2002; Farlam, 2005; Semler, 2005; Mor and Sehrawat, 2006; Ploeg and Casey, 2006; Moszoro & Krzyzanowska, 2007; Mensah, 2008; Porter, 2008; Thay, 2008; Cohen, 2010).

PPPs come with challenges such as high transaction costs, corruption, resistance from stakeholders, complex and demanding contracts, limited capacity of public agencies, need for changes in policies and regulatory framework, lack of bankable projects, private sector not always being efficient, loss of public accountability and transparency, and difficulties in achieving optimal allocation of risk (Trujillo, et al., 1997; Cohen, 2002; Farlam, 2005; Semler, 2005; Mor and Sehrawat, 2006; Ploeg and Casey, 2006; Moszoro & Krzyzanowska, 2007; Mensah, 2008; Porter, 2008; Thay, 2008; Cohen, 2010).

3.4 SUMMARY OF CHAPTER

Chapter three has reviewed the conceptual framework of innovative financing of infrastructure projects with discussions on topics such as innovative financing of infrastructure, the concept of innovative financing of infrastructure, and public-private partnerships. The discussions were supported with the works of researchers such as Cohen (2002), Semler (2005), Mor and Sehrawat (2006), Ploeg and Casey (2006, 2008) Nichol (2007), and Nicolosi (2009). The next chapter discusses some innovative financing of infrastructure projects in Ghana.

CHAPTER FOUR

OVERVIEW OF INNOVATIVE FINANCING OF INFRASTRUCTURE PROJECTS IN GHANA

4.0 INTRODUCTION

Chapter three presented the conceptual framework of innovative financing of infrastructure, focussing on such concepts as new or non-traditional sources of revenue, new financing mechanisms designed to leverage resources, new fund management techniques, demand management techniques, and new institutional arrangements. The chapter was then concluded with discussions on public-private partnerships which tend to dominate discussions on innovative financing of infrastructure projects. This chapter presents an overview of some innovative financing of infrastructure projects in Ghana in the context of the concepts discussed in the previous chapter. The essence of this chapter is to capture the efforts that Ghana is making in innovative financing of infrastructure with the ultimate goal of identifying the strategic issues in Ghana.

4.1 BACKGROUND

After independence from Britain in 1957, the economy of Ghana weakened, resulting in a lack of investment in the provision of new and maintenance of existing infrastructure (World Bank, 2002). The situation was worst during the late 70s and 80s. The economic depressions faced by many Least Developed Countries (LDCs) during the late 70s and 80s resulted in the lack of investment and a general downward trend in almost all the major facets of the Ghanaian economy. This economic depression coupled with the high population, rural-urban migration and

the growth of cities and towns without a corresponding rise in provision of infrastructure, resulted in a major stagnation and pressure on the country's infrastructure base (Andreski, 2008). However, with the adoption of more market-oriented policies and support of the international community, Ghana's economy and infrastructure have, in recent years, begun to improve (World Bank, 2002). In attempts at bridging the huge infrastructure financing gap, Ghana has also been using innovative financing approaches some of which are discussed below.

4.2 EDUCATIONAL INFRASTRUCTURE

The educational sector of Ghana happens to be one on the sectors with serious infrastructure problems. To date children attend classes under trees while some basic school authorities are compelled to run the shift system due to inadequate supply of infrastructure (www.getfund.org). Consequently, efforts are being made at various levels including parent teacher associations and student representative councils, to find additional sources of finance for educational infrastructure.

4.2.1 The Ghana Education Trust Fund (GETFund)

An Act of Parliament established the Ghana Education Trust Fund on 25 August 2000 to among other things, assist nation-wide with financing of education. The main objective of the fund as enshrined in the policy document is to provide finance to supplement the provision of education at all levels by the government. Primarily, the fund is for the provision of essential academic facilities and infrastructure in public educational institutions, among others.

According to the law establishing the Fund the sources of money for the GETFund includes the following:

- One fifth of the total VAT accruals credited to the account of the GETFund at the Central Bank by the Ministry of Finance and Economic Planning within thirty days of the end of the month for which it was collected.
- Monies accruing to the Fund from investments made by the Board of Trustees of the Fund.
- Grants, donations, gifts and other voluntary contributions to the Fund.
- Other monies or property that may in any manner become lawfully payable and vested in the Board of Trustees of the Fund.
- Other monies allocated by parliament.

On the infrastructure front the GETFund has since 2001, financed the construction of; pre-schools; classroom blocks for second-cycle and basic schools; dormitory blocks for secondary schools; VOTEC resource centres in all regions; hostels for public tertiary institution; and payment for numerous infrastructure projects in tertiary institutions (www.getfund.org).

Arguably these initiatives are laudable, however, the fact that there are pupils in Ghana who attend classes under trees and the lengthy delivery time for projects financed with money from the GETFund, indicates that there are some problems with the strategy in the use of this innovative method of financing infrastructure project. Indeed, as presented by the GETFund Consultative Forum, (2010) there are serious challenges in the areas of fund management, fiscal prudence, allocation of funds, and corruption. According to the review compiled by the

Technical Department of the GETFund Secretariat, there is a daunting number of abandoned projects, and until recently there was paucity of information and data regarding GETFund Projects (GETFund Consultative Forum, 2010).

4.2.2 Mega Hostel Project – Legon

This is an ongoing 35.5 million GH Cedis large-scale development of on-campus student accommodation for the University of Ghana, Legon Campus, as a response to the acute shortage of student residential accommodation on campus (only 30% of student population has accommodation on campus). The project is being partly financed with a 26 million GH Cedis medium-term debt financing from banks, with Cal Bank as the lead arranger. The project which started in 2007 is almost complete and is expected to be handed over in August 2010.

The system involves a form of project financing technique in which the university is using its rental revenues (user fees) from the existing hostels and the future rental revenues from the project to pay back the loan. Already the banks have employed an agent that collects the residential facility user fees from students in the university's hostels as part of measures to retrieve the loan (Cal Bank, Development Office UG). The system is innovative in the sense that traditionally, infrastructure projects have been financed with allocations from the central government and other external source. Thus, the whole arrangement is innovative in the sense that it involves the use of a new method (using future revenues as collateral) to secure the needed financing. In fact, this is the first time such an arrangement is being used for the development of infrastructure on the university campus (Development Office, University of Ghana, 2010).

4.3 TRANSPORTATION INFRASTRUCTURE - Road Fund

In 1985 Ghana was one of the first countries in Africa to establish a Road Fund under an administrative arrangement (Legislative Instrument). The government as a form of innovation introduced tolls to raise funds for road maintenance. However, road maintenance continued to face difficulties such as irregular and insufficient releases, inadequate financial management system and, since 1996, the government has expanded the revenue stream through fuel levies, vehicle registration fees and road-use fees. The fuel levy provides about 90% of Road Fund revenues with tolls, transit and license fees providing the rest. Financing for the road network now comes from three main sources: the government, road users and foreign donors. Until recently, the government has been the largest source of funding for road construction and maintenance (AfDB/OECD, 2006). For example, in the context of overall road sector financing, for the period of 1996 to 2001 the Road Fund contributed 25%, Development Partners 44% with Government Consolidated Fund the remaining 31% (Andreski, 2008).

The use of the road fund to finance road maintenance in Ghana is seen here as innovative in that until the advent of the fund this had traditionally not been the situation. Again, as seen from above the fund plays a supplementary role to those of the development partners and the consolidated fund in helping to raise the necessary financing for road infrastructure.

4.4 THE LOCAL GOVERNANCE FRONT - District Assemblies Common Fund

The District Assemblies Common Fund (DACF) was introduced in 1994, to back up administrative decentralisation with fiscal decentralisation. As a form of innovative financing of infrastructure, the district assemblies' discretion over use of DACF is limited, as around half of

the fund must be used in line with central government's priority spending areas (mainly capital projects). The other half has often been used to match donor funding (World Bank, 2003). Until recently (PPP in waste management), most district assemblies have not been much innovative in financing of infrastructure projects on the local front, to the extent that in implementing the Ghana poverty reduction strategy (GPRS), which was produced in February 2003, the district assemblies have been criticised for over reliance on centrally provided DACF funding (Jack and Braimah, 2004; Dirie, 2005). As seen from above the use of the DACF to finance infrastructure is innovative in so long as it involves earmarking part of the general revenue for infrastructure development which was traditionally not the case. The use of the DACF to finance infrastructure also involves new financing mechanisms designed to leverage resources (matching donor funding), and this makes the approach innovative.

4.5 WATER INFRASTRUCTURE - Use of Revolving Funds For Water Infrastructure

The Association of Water and Sanitation Development Boards (AWSDBs) was established in 1995 in a CIDA-funded rehabilitation project involving 14 priority communities. A minimum deposit was required for O&M, representing 5% of project capital costs. The 14 communities formed a private association to save the deposit, which was then transferred to the water sector agency (CWSA). As of 2005, accumulation of funds had grown and 22 more communities had joined (Cardone and Fonseca, 2006).

A key strategy of the AWSDBs for the mobilization of deposits was to establish a reserve fund, which is invested in Treasury Bills and other short-term, high return investments. The interests earned on the reserve fund represent a large capital base for member boards in each district for

their water supply and sanitation activities. Credit provision began in 2001 and monies had been disbursed to 20 member water boards as at 2005 for major replacement works and to cover the waived 5% community contribution of the poorest communities. Credit delivery processes comprise both formal and informal methodologies. Formal pre-screening techniques require member boards to have their application approved by the District Assembly, which also acts as guarantor in case of default. Amounts accessed depend on the value of shares purchased by the respective board, the extent of planned rehabilitation and expansion and also on the board's available funds. Using this approach to finance infrastructure is obviously innovative. The establishment of a reserve fund, which is invested in Treasury Bills and other short-term, high return investments, clearly involves new or non-traditional sources of revenue, new financing mechanisms designed to leverage resources, and new fund management techniques, all of which are concepts in innovative financing of infrastructure.

The AWSDBs have begun to take steps to ensure profitability by charging commercial rates. However, a low rate of loan recovery (32%) is now affecting the level of reserve funds and the AWSDBs' potential to earn income to support its operations. Continuous withdrawal is depleting reserves available for investment and for operational expenses. Low investment levels mean low returns, which reduces the capital base and the ability to support member boards (Agbenorheri and Fonseca, 2005; Cardone and Fonseca, 2006).

4.6 HOUSING INFRASTRUCTURE

There have been a number of attempts at innovation although not very successful including the housing bond scheme.

4.6.1 Housing Bond Scheme (Ministry Of Works And Housing With NTHC Ghana Ltd)

The Ministry of Works and Housing (MoWH) was in 2004 working with National Trust Holding Company (NTHC) to raise US\$200 million worth of domestic and foreign capital through a Housing Bond Scheme. The plan was to sell 5year Bonds on the international market, but international regulations required the Government to have a local ‘co-arranger’ in place, hence NTHC’s involvement. Historically it had only been possible to raise about US\$5 million through domestic Bonds in Ghana, so this scheme aimed to generate at least 70% of the funds from international sources (mainly from the UK and US). Funds raised were to be used for the provision of low-income, safe and affordable housing for all workers in Ghana (GoG, 2004). Clearly this represents an innovative attempt in the financing of infrastructure in Ghana, and is in line with the concept of finding new or non-traditional sources of revenue as captured in the conceptual framework.

4.7 SUMMARY OF CHAPTER

The chapter which ends the literature review has presented an overview of innovative financing of infrastructure in some selected areas in Ghana including education, transportation, water and sanitation, and housing. The mechanic involved and why it is considered innovative has been explained in each circumstance. The next chapter discusses research methods with the view of finding the best approach to achieve the research aims and objectives.

CHAPTER FIVE

RESEARCH METHODS

5.0 INTRODUCTION

Chapter four concluded the discussions on the pertinent literature on the topic with an overview of some innovative financing of infrastructure in Ghana. This chapter discusses research methods with the view of finding the best approach to achieve the research aims and objectives. The chapter describes the research design and methodology, including the philosophical position of the research, research strategy, and research design. The methods and techniques which were used in the data collection and analyses are also presented.

The purpose of the methodology and research design is to provide direction in the planning and implementation of the study in a way that is most likely to achieve the intended goal. The methodology is a blueprint for conducting the study (Burns & Grove, 1998). Similarly, Polit and Hungler (1999) refer to it as the process of following the steps, procedures and strategies for gathering and analyzing data in research investigation. These methods describe in detail how the study is to be conducted. According to Burns & Grove (1998), methodology includes design, setting, sample, methodological limitation and data collection and analysis techniques in a study. It is the know-how of the scientific methods and techniques employed to obtain the valid knowledge. Thus methodology is the way by which we gain knowledge about the world, trying to discover how we can go about the task of finding out what we believe to be true (Christou, et al., 2008).

5.1 PHILOSOPHICAL CONSIDERATIONS

There are issues relating to the philosophical design and methodological approach that has to be taken into consideration in a research. Philosophical questions of existence, knowledge, and value, have significant impacts in the research design (Koetting, 1996; Christou , et al., 2008). Consequently, such philosophical issues of ontology, epistemology, axiology, and methodology need to be addressed explicitly since they shape the choice of research instruments (Christou, et al., 2008).

The term ontology is used to answer the question what kinds of things exist in the world. Ontology refers to questioning the existence of a ‘real’ world that is independent of our knowledge; it is a theory of being (Marsh and Stoker, 2002). According to Vos (1998), ontology refers to the nature of reality and human behaviour. Ontology is the nature of reality, something immutable, an undiscovered truth (Christou, et al., 2008). It is the technical term in philosophy, theory of being, where things appear in very different ways in different traditions of philosophical thinking. Sometimes it is something socially constructed; a human product that results in conflicting, multiple realities which can be changed over time, and sometimes not (Christou, et al., 2008). Thus the ontological position can be objectivism or constructionism. According to Bryman (2001), whilst the objectivism is an ontological position that implies that social phenomena confront us as external facts that are beyond our reach of influence, constructionism asserts that social phenomena and their meanings are continually being accomplished by their social actors. The constructionist approach stresses that there is no objective reality but rather constructions of it (Christou, et al., 2008).

According to Orlikowski & Baroudini (1991), epistemology refers to the question of how knowledge is created. From Vos (1998) epistemology is the relationship of researchers to reality and the road that they will follow in the search for truth. Epistemology is the branch of philosophy concerned with how individuals determine what is true (Streubert & Carpenter, 1999). Marsh and Stoker (2002) also described epistemology as the technical term of the theory of knowledge. It looks at the relationship between the inquirer and what can be known by direct observation at the external world to uncover knowledge or when the observer and the subject of inquiry must interact to create knowledge (Christou, et al., 2008). In this regard the literature identifies two main epistemological stands: positivism and interpretivism.

The difference between positivism and interpretivism is the way they approach knowledge. For positivists, scientific knowledge is established through the accumulation of verified facts (Bryman, 2001). Science is thus, deductive and must be carried out in an objective way (free of researcher effects). Interpretivism on the other hand, sustains that social phenomena do not exist independently of our interpretation of them; rather it is this interpretation or meaning of social phenomena, which affects social reality. Consequently, an objective analysis, which is the main premise of positivism, is impossible because the researcher is also part of the research process (Christou, et al., 2008).

Axiology is a field of philosophical investigation which considers problems like the difference between a matter of fact and a matter of value (Bossé, 2006). The literature indicated that axiological consideration is concerned with whether the research philosophy surrounding the reality is “value free” or “value driven”. According to (Heron & Reason 1997), the axiological

question asks what is intrinsically valuable in human life, in particular what sort of knowledge, if any, is intrinsically valuable. The axiological position can be realism or social constructivism (Bossé, 2006). While social constructionists are of the view that researchers have values and these values help to determine what are recognized as facts and the interpretations which are made, the realists hold the view that the choice of what to study or how to study can be examined by an objective criteria.

The ontological and epistemological approaches adopted by a researcher, have direct impacts to the methodological approach (Christou, et al., 2008). The view about the nature of the world (ontology) has impacts on how the inquirer views the nature of world's knowledge (epistemology). This will have further impacts to the inquirer's view according to how that knowledge can be revealed (methodology). According to Hughes (1990), cited in Christou, et al., (2008), every tool or procedure is inextricably embedded in commitments to particular versions of the world (ontology) and to knowing that world (epistemology). The question of axiology is a necessary complement to balance, and make whole, the concern with truth exhibited by ontology, epistemology, and methodology (Heron and Reason, 1997).

According to Gill and Johnson (1991), the philosophical assumption of positivist epistemological position invariably leads towards the exclusive utilization of nomothetic methodology. This successively leads in stressing the deductive research which seeks to provide explanation through an analysis of informal relationships and through covering norms. Prominence by the positivists is given upon replicability, which adopts a highly structured research methodology based on either physical or statistical controls in order to smooth the progress of the examinant hypothesis.

As result, the main research methods that are used by the positivists are the laboratories, surveys and quasi-experiments (Christou, et al., 2008).

In contrast to the positivist approach to methodological matters, the interpretivists accept ideographic methods which stresses on inductive approach, concentrating upon the subjective appreciations of human actors. In order for investigators to understand the subjective accounts, they immerse themselves in the research context giving emphasis to the creation and utilization of qualitative data. Interpretivists prefer to blend in the data minimizing the reaction to the researcher's presence in the natural environment of the subjects under investigation rather than use control as positivists do. Therefore interpretivists are more liable in using action research, case studies and ethnography (Christou, et al., 2008).

5.2 PHILOSOPHICAL POSITION OF THE RESEARCH

The position adopted for this research at the ontological level was objectivism. This is because the strategic issues of innovative financing of infrastructure projects exist as external facts that are beyond the reach of influence of the researcher. The strategic issues are objective realities and not constructions of the researcher. Thus the objectivism ontological position was followed in answering the research question what are the strategic issues of innovative financing of infrastructure projects in Ghana?

Epistemologically, this research followed the positivists approach to knowledge. For the positivists, scientific knowledge is established through the accumulation of verified facts (Bryman, 2001). The research was of the view that the identification and analysis of the strategic

issues of innovative financing of infrastructure projects must be carried out in an objective way (free of researcher effects) which can be replicated.

The axiological position adopted for this research was realism. This research was of the view that the choice of what to study or how to study could be examined by objective criteria. In other words the values of the researcher played no role in determining what were recognized as facts and the interpretations which were made, in establishing the strategic issues of innovative financing of infrastructure projects in Ghana.

5.3 RESEARCH STRATEGY

Apart from the philosophical considerations underpinning this research, there is the need for the clarification of the orientation of the researcher to the conduct of research (Bryman 2004), cited by Baiden, 2006. The research strategy deals with how the research objectives are questioned. The three main strategies are quantitative, qualitative, and triangulation (Baiden, 2008). The decision to follow any particular strategy depends on the purpose of the study, the type and availability of information for the research (Naoum, 2002), cited by Baiden (2006). Triangulation research involving qualitative and quantitative strategies was the strategy adopted to elicit the relevant data to help answer the research question. Triangulation was adopted because it was necessary to first explore the strategic issues of innovative financing of infrastructure projects in the Ghana with qualitative research. Then the findings from the qualitative research were tested using the quantitative research strategy.

5.4 RESEARCH DESIGN

This section of the thesis deals with the framework for data collection and analysis. Research design is the structure that guides the execution of the technique for collection and analysis of data. It is, therefore, the framework within which the research method is employed. It enables the researcher to connect empirical data to its conclusions, in a logical sequence to the initial research question of the study (Bryman 2004; Yin 2003), cited by Baiden (2006). Research design includes experimental, survey, action research, and case study (Blismas, 2001), cited by Baiden (2006).

This research followed a survey design which was preceded by in-depth interviews to satisfy the high exploratory potential. In this study the in-depth interview, (the exploratory method) was included to gain new insights, discover new ideas and/or increase knowledge in the strategic issues of innovative financing of infrastructure projects. A survey design was selected because of the need for generalisation on the strategic issues of innovative financing in Ghana. It was also to enhance the reliability of observations and improve replications because of the inherent standardised measurement and sampling procedures (Blismas 2001; Oppenheim 2003), cited by Baiden (2006).

5.5 RESEARCH PROCESS

This aspect of the research methods addresses the sampling method, data collection instruments, methods, and procedures. It provides detailed explanations to each of the methods employed and how the methods adopted were used to address the aims, objectives and research questions.

5.5.1 Scope of Questionnaire Survey

In Ghana, the financing of infrastructure projects have traditionally been through the national budget and the implementing agencies which headquarters are located in the capital city-Accra, with branch offices in the regional capitals. Hence majority of the experts in infrastructure financing including those of the development partners tend to be located in Accra. Moreover, with the skewed nature of our development, the head offices of institutions involved in innovative financing of infrastructure such as the GETFund, and the Road Fund are all located in Accra. Again majority of the financial institution involved in the financing of infrastructure projects have their head offices located in Accra. Thus geographically one would expect that the research will mostly be in Accra.

However, across the globe, the uptake of innovative financing of infrastructure started at the local level, and consolidated at higher levels of government (Ploeg, 2006). Hence the research focused on the local government level. In Ghana the district assemblies are responsible for the provision of local infrastructure such as local roads and school buildings (Malcolm & Braimah, 2004). At the local government level the research was limited to the Ashanti region, for the reason that it happens to be the region with the largest number of districts; also looking at the time frame for the research opting for the region made it more feasible in terms of questionnaire administration.

5.5.2 Data Sources

Prior to the field survey a desk survey (literature review) was conducted. The desk survey formed the basis for the development of the field survey instruments using questionnaires, and

interviews. The field survey (collection of empirical data) consisted of in-depth exploratory interviews and survey questionnaires. After identifying the lists of challenges and strategic issues of innovative financing of infrastructure projects by different researchers in different context and geographical locations; the adoption of the in-depth exploratory interview was to help in identifying the challenges and strategic issues of innovative financing of infrastructure projects in the Ghanaian context, since innovative financing is relative.

5.5.3 Sampling and Sample Size Determination

Sampling is the process of selecting the people with whom to conduct the research. The sampling criteria were based on the research problem, purpose, design and practical implications of the research topic. Hence using convenience and purposive sampling the sample was obtained from a population of finance officers, planning officers, and engineers of the MMDAs involved in the financing and provision of infrastructure projects in the Ashanti Region.

In convenience sampling participants are included in the study because they happen to be at the right place at the right time. Convenience sampling is a type of nonprobability sampling which involves the sample being drawn from that part of the population which is close to hand. That is, a sample population selected because it is readily available and convenient. Thus the population of officials of the MMDAs involved in the financing and provision of infrastructure projects in the Ashanti Region was chosen because of convenient location.

Purposive sampling refers to the judgmental sampling that involves the conscious selection by the researcher of certain participants to include in the study. Sample sizes, which may or may not

be fixed prior to data collection, depend on the resources and time available, as well as the study's objectives. Thus with the study's objectives as a criteria only officials of the MMDAs involved in the financing and provision of infrastructure projects were included in the sample.

After using the convenience and purposive sampling to limit the accessible population to finance officers, planning officers, and engineers of the MMDAs involved in the financing and provision of infrastructure projects in the Ashanti Region, the census approach was used in the determination of the appropriate sample size. This approach according to Israel (1992), cited in Owusu and Badu (2009), eliminates sampling errors and provides data on all individuals in the population. Thus with the current number of 27 MMDAs in the Ashanti Region, the sample size for the survey was 81.

5.5.4 Questionnaires Development

The literature review and the in-depth exploratory interview guided the formulation of the questionnaires so that only the relevant questions in the context of the research were asked. The format of the questionnaires was guided by considerations of appeal to respondents, ease of reading and supplying the required data so that the research participants' time were not wasted during the data collection. The questionnaires were designed to include; opened-ended question, closed-ended question, and scaled-response questions.

5.5.5 Content of the Questionnaires

In all four (4) questions were asked in the questionnaires. The first two questions were intended to gather information about the participants. The two questions sought information regarding the

capacities in which the respondents work in their various institutions and their experiences in the financing and provision of infrastructure projects in Ghana. The intention here was to help establish the authenticity and the reliability of the information supplied by the participants.

After identifying the challenges and strategic issues of innovative financing of infrastructure projects delivery in Ghana from the exploratory interviews, the purpose of questions three (3) and four (4) were to test the results of the interviews. In question three (3) the respondents were asked to rank the challenges on a scale of 1 to 5, and then also, to rank on the same scale the strategic issues in question four (4).

5.5.6 Questionnaires Distribution

The questionnaires were distributed and retrieved in person in order to ensure that the questionnaires were completed by the intended recipients, and also to help improve the response rate. The questionnaires were personally administered via face-to-face and also with the help of some teachers who were engaged as research assistants.

5.5.7 Data Analytical Tool

The selection of the analytical tool is contingent on a thorough review of available analytical and statistical tools. In deciding which test is appropriate to use, it is important to consider the type of variables that you have (i.e., whether your variables are categorical, ordinal or interval and whether they are normally distributed). Consequently, non-parametric statistical method involving chi square testing was adopted in analysing the data; the kinds of data derived from the

survey were mostly nominal and ordinal data. The chi-square test was also chosen because of uncertainty about the nature of the distribution of the population.

Factor analysis was used to analyze interrelationships among the large number of issues identified in the literature and to explain these issues in terms of their common underlying dimensions. Factor analysis is a form of exploratory multivariate analysis that is used to either reduce the number of variables in a model or to detect relationships among variables (University of California).

5.6 CHAPTER SUMMARY

This chapter has discussed research methods and given reasons for the options selected to achieve the research aims and objectives. The chapter also described the research design and methodology, including the philosophical positions of the research, research strategy, and research design adopted for this study. The methods and techniques which were used in the data collection and analyses were also presented. The chapter concluded with the research process and covered issues such as scope of questionnaire survey, data sources, sampling and sample size determination, questionnaires development, content of the questionnaires, questionnaires distribution, and data analytical tools.

CHAPTER SIX

DATA ANALYSIS AND DISCUSSION OF RESULTS

6.0 INTRODUCTION

This section presents data analysis and provides discussions on the results obtained. The analyses consist of descriptive statistics, chi-square test, and factor analysis. After identifying fourteen (14) variables as challenges of innovative financing of infrastructure projects delivery in Ghana, and thirteen (13) variables as the strategic issues of innovative financing of infrastructure projects delivery in Ghana, through the literature review and the exploratory interviews, the next step of the research was to confirm these challenges and strategic issues with data from a large sample of people involved in the financing and provision of infrastructure assets using survey questionnaires.

The questionnaire consisted of four (4) questions: the purposes of the first two questions were to determine the profession and experience of the respondents (**Appendix B**). In the last two questions on the questionnaire, respondents (finance officers, planning officers, and engineers of the metropolitan, municipal, and district assemblies) were asked to respectively rate the extent of the 14 challenges of innovative financing of infrastructure projects delivery, and relative importance of the 13 strategic issues of innovative financing of infrastructure projects delivery. On the extent of challenges the rating required the respondents to determine whether the variable is “Not critical (1)”, “Less critical (2)”, “Averagely critical (3)”, “Critical (4)” and “Very critical (5)”. Whiles on the strategic issues the respondents had to determine whether the variable is “Not

important (1)”, “Less important (2)”, “Averagely important (3)”, “Important (4)” and “Very important (5)”.

Out of the 81 questionnaires distributed, 61 questionnaires representing 75.31 percent were completed, and these were used in the analyses. The high response rate of 75.31 percent may be attributed to the strict adherence to the techniques employed in distributing the questionnaires and the persistent follow ups to retrieve the questionnaires. The whole survey process took approximately 10 weeks to complete. As earlier noted two main statistical analyses (chi-square test (X^2) of significance and factor analysis) were undertaken, in addition to the initial descriptive statistics conducted.

6.1 RESPONDENTS PROFILE

A knowledge of the background of the respondents helps to create confidence in the credibility of data collected. As earlier indicated, the main characteristics that were of interest to this study were the profession and experience. Respondents were asked to indicate their professions just to be assured that the targeted respondents actually completed the questionnaire, and not for the analysis of which profession answered in which direction. The experience of the respondents in the context of this research is determined as the number of years of practice and involvement in the provision of infrastructure assets. The assumption here is that all things being equal a person's years of experience is likely to have a direct influence on his experience with innovative financing of infrastructure options and hence be in a position to supply credible answers to the questionnaire. **Table 6.1** presents the results of the years of experience in the provision of infrastructure assets. From **Table 6.1**, 18 percent of the respondents have up to 5 years of

working experience in the provision of infrastructure assets; 49.2 percent have working experience from 6 years to 10 years; 21.3 have working experience of 11 to 15 years; 9.8 percent have working experience of 16 to 20 years; and the remaining 1.6 percent have over 20 years experience. In all the majority of the respondents constituting 82% indicated they have been involved in the financing/provision of infrastructure for over five years. It may therefore be concluded that those who responded to the survey are sufficiently experienced in the financing or provision of infrastructure projects to provide credible data.

Table 6.1: Respondents' years of experience

Years of experience		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	up to 5 years	11	18.0	18.0	18.0
	6 to 10 years	30	49.2	49.2	67.2
	11 to 15 years	13	21.3	21.3	88.5
	15 to 20 years	6	9.8	9.8	98.4
	over 20 years	1	1.6	1.6	100.0
	Total	61	100.0	100.0	

6.2 CHALLENGES OF INNOVATIVE FINANCING OF INFRASTRUCTURE

PROJECTS DELIVERY

As was noted in the introduction to this chapter, fourteen (14) variables were identified as the challenges of innovative financing of infrastructure projects delivery in Ghana. The analyses of these variables using descriptive statistics, test of hypothesis, and factor analysis are discussed below.

6.2.1 DESCRIPTIVE STATISTICS

Prior to the main non-parametric test of the study, preliminary descriptive analysis such as mean ranking and standard deviations of each of the challenges variables was conducted to help provide a clearer picture of the outcome of the survey; and the results are tabulated in **Table 6.2.1**. Using the five-point Likert rating scale, a variable was arbitrary considered critical if it had a mean of 3.5 or more (Field, 2005) cited in Owusu and Badu (2009). The standard error is the standard deviation of sample means and it is a measure of how representative a sample is likely to be of the population (Field, 2005). A large standard error reflects a lot of variability between means of different samples and a small standard error suggests that most sample means are similar to the population mean and so the sample is likely to be an accurate reflection of the population (Field, 2005).

From **Table 6.2.1** almost all the variables have mean values above the accepted population mean of 3.5, it is reasonable therefore to conclude that they constitute the challenges of innovative financing of infrastructure projects in the Ghanaian context. The standard error associated with all the means were relatively closer to zero suggesting that the sample chosen is an accurate reflection of the population. Finally, from the results in **Table 6.2.1** the standard deviations of a large majority are less than 1.0 signalling that, there is little variability in the data collected and consistency in agreement among the respondents.

Thus base on the descriptive statistics alone, it could be confidently concluded that the variables identified as the challenges of innovative financing of infrastructure projects delivery in Ghana through the literature review and the interviews reflect the views of the respondents.

Table 6.2.1: Descriptive Statistics (challenges)

Challenges	N Statistic	Mean		Std. Deviation Statistic
		Statistic	Std. Error	
Expectations of the populace	61	4.28	.094	.733
Improving revenue collection	61	4.26	.104	.814
Adequacy of revenue	61	4.03	.093	.730
Enforcement of laws	61	3.98	.095	.741
Maintaining and replacing infrastructure assets	61	3.90	.104	.810
Cost efficiency (delays/cost overruns)	61	3.89	.094	.733
Issues of how funds are spent	61	3.84	.126	.986
Fiscal prudence	61	3.70	.100	.782
Exploring alternative methods	61	3.64	.091	.708
Sustainability of the strategy in the long run	61	3.64	.117	.913
Governance and institutional capacity issues	61	3.62	.108	.840
Excessive reliance on traditional sources	61	3.36	.150	1.170
Corruption	61	3.34	.134	1.047
Lack of long-term financing at fixed interests	61	2.90	.138	1.076
Valid N (listwise)	61			

6.2.2 TEST OF HYPOTHESES

The descriptive analysis of the results have largely indicated that the respondents agreed with the identified variables as being the challenges of innovative financing of infrastructure projects delivery in Ghana. However, it is possible that these observations might be due to chance, rather than being the true reflection of the entire population. It was therefore necessary to test the data with an appropriate statistical method. The chi-square test (a non-parametric test) was chosen because of uncertainty about the nature of the distribution of the population. Thus the chi-square test of significance was conducted for the challenges of innovative financing of infrastructure variables. The *null hypotheses* were stated that “the challenges of innovative financing of infrastructure variables identified by the review and in-depth interviews are not critical in the Ghanaian context”; and the *alternative hypotheses* stated that “the challenges of innovative financing of infrastructure variables identified by the review and in-depth interviews are critical in Ghana”. Below are the details of the test:

Hypotheses

H₀: “the challenges of innovative financing of infrastructure variables identified by the review and in-depth interviews are not critical in the Ghanaian context”.

[i.e., the population mean, U_0 , was less than or equal to 3.5. ($H_0: U \leq U_0$)]

H_a: “the challenges of innovative financing of infrastructure variables identified by the review and in-depth interviews are critical in Ghanaian context”.

[i.e., the population mean, U_0 , was more than 3.5. ($H_0: U > U_0$)]

Significance Level

$\alpha = 0.05$

Rejection Region

Reject the null hypothesis if $p\text{-value} \leq 0.05 = \alpha$.

The hypotheses were tested using the Chi Square test at the conventional p-values of $p \leq 0.05$. The rule for the acceptance or rejection of a hypothesis is that if a p-value > 0.05 is achieved, the hypothesis is accepted but if p-value of ≤ 0.05 is achieved, the hypothesis is rejected (Field, 2005). The results of the chi square tests presented in **Table 6.2.2** indicate that almost all the challenges of innovative financing of infrastructure projects variables identified recorded p-values of ≤ 0.05 . This signals that the null hypotheses that the challenges variables identified from the literature and interviews are not critical in innovative financing of infrastructure projects in the Ghanaian context was not supported and therefore rejected in most cases.

However, the null hypothesis was accepted for the variable “Adequacy of revenue”. The chi-square test presented in **Table 6.2.2** recorded a p-value (0.06) which is more than the conventional p-value (0.05) for the variable “Adequacy of revenue”. Therefore the null hypothesis which stated that “*Adequacy of revenue is not a critical challenge of innovative financing of infrastructure projects delivery in Ghana*” was accepted. This is not too surprising because, an aspect of the concept of innovative financing of infrastructure projects delivery emphasises the supplementary nature of these mechanisms, and also hummers on the recognition of the potential synergy in combining methods (as in the use of unbundle mechanisms) to finance projects. Therefore not being able to identify a single innovative financing method with adequate revenue for financing an infrastructure project should not be considered as a strong challenge.

Table 6.2.2: Test of hypotheses (challenges)

Challenges of innovative financing of infrastructure	Chi-square	df	Asymp. Sig. <i>p</i> values	Decision
Adequacy of revenue	5.639a	2	.060	Accept
Cost efficiency (delays/cost overruns)	43.852b	3	.000	Reject
Issues of how funds are spent	11.066b	3	.011	Reject
Sustainability of the strategy in the long run	13.951b	3	.003	Reject
Fiscal prudence	34.410b	3	.000	Reject
Excessive reliance on traditional sources	22.852c	4	.000	Reject
Expectations of the populace	34.410b	3	.000	Reject
Lack of long-term financing at fixed interests	16.951c	4	.002	Reject
Exploring alternative methods	42.672b	3	.000	Reject
Maintaining and replacing infrastructure assets	61.541c	4	.000	Reject
Improving revenue collection	60.885c	4	.000	Reject
Enforcement of laws	80.885c	4	.000	Reject
Corruption	21.377c	4	.000	Reject
Governance and institutional capacity issues	25.230b	3	.000	Reject

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 20.3.

b 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 15.3.

c 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 12.2.

6.2.3 FACTOR ANALYSIS

For such relatively large number of the dependent variables (14) involved in the study, it is possible that some of the variables are measuring the same underlying effect. It was therefore considered appropriate to use factor analysis for data reduction to establish which of the variables could be measuring aspects of the same underlying dimensions. Factor analysis is a statistical approach involving finding a way of condensing the information contained in a number of original variables into a smaller set of dimensions (factors) with a minimum loss of information (Hair et al., 1992), cited in (DeCoster, 1998).

6.2.3.1 Initial Considerations

Factor analysis is based on the correlation matrix of the variables involved, and correlations usually need a large sample size before they stabilize. Therefore the reliability of factor analysis is also dependent on sample size. As a rule of thumb, a bare minimum of 10 observations per variable is necessary to avoid computational difficulties (DeCoster, 1998). In SPSS a convenient option is offered to check whether the sample is big enough: the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO-test). The sample is adequate if the value of KMO is greater than 0.5. The data from the survey for the challenges of innovative financing of infrastructure projects is adequate by these tests. The data has 61 observations per variable, with the value of the KMO greater than 0.5 (**Table 6.2.3.1**).

Table 6.2.3.1: KMO and Bartlett's Test (challenges)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.854
Bartlett's Test of Sphericity		528.303
	Approx. Chi-Square	
	Df	91
	Sig.	.000

6.2.3.2 Data Screening/Preliminary Analysis

When conducting factor analysis it is customary to first look at the inter-correlation between variables. With respect to the correlation matrix, two things are important: the variables have to be intercorrelated, but they should not correlate too highly (extreme multicollinearity and singularity) as this would cause difficulties in determining the unique contribution of the variables to a factor (Field, 2000) cited in Field (2005). In SPSS the intercorrelation is checked by using the KMO test and Bartlett's test of sphericity, while multicollinearity is detected via the determinant of the correlation matrix.

The KMO statistic varies between 0 and 1. A value of 0 indicates that the sum of partial correlations is large relative to the sum of correlations, indicating diffusion in the pattern of correlations (hence, factor analysis is likely to be inappropriate). A value close to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors. According to Hucheson and Sofroniou (1999), cited in Field (2005), values between 0.8 and 0.9 are great. From **Table 6.2.3.1** factor analysis is appropriate for the challenges data.

Bartlett's measure tests the null hypothesis that the original correlation matrix is an identity matrix. For factor analysis to work we need some relationships between variables and if the R-matrix were an identity matrix then all correlation coefficients would be zero. Therefore, the craving is for this test to be significant (ie have a significance value less than 0.05). A significant test tells us that the R-matrix is not an identity matrix; therefore, there are some relationships between the variables we hope to include in the analysis (Field, 2005). From **Table 6.2.3.1** Bartlett's test is highly significant ($p < 0.001$), and therefore factor analysis is appropriate.

As noted earlier the determinant of the matrix is used in testing for multicollinearity or singularity. The determinant of the R-matrix should be greater than 0.00001. From Field (2005) if it is less than this value then variables that correlate very highly ($R > 0.8$) should not be included in the analysis. The determinant of the correlation matrix for the challenges of innovative financing of infrastructure projects variables is less than 0.00001, (6.17E-005). However, no two variables correlate very highly; the highest value of R is 0.732 (**Table 6.2.3.2**). According to Field (2005), mild multicollinearity is not a problem for factor analysis, and hence the data is appropriate for factor analysis.

Table 6.2.3.2: Correlation Matrix (challenges)

	a	b	c	d	e	f	g	h	I	j	k	l	m	n
a	1.00 0	.163	.679	.618	.572	.396	.606	.493	.669	.485	.434	.494	.661	.564
b	.163	1.00 0	- .073	- .038	.114	.380	- .064	.155	.080	.009	- .060	- .065	.096	- .017
c	.679	- .073	1.00 0	.581	.649	.254	.617	.487	.535	.480	.552	.498	.620	.648
d	.618	- .038	.581	1.00 0	.479	.249	.700	.489	.569	.424	.532	.336	.620	.558
e	.572	.114	.649	.479	1.00 0	.082	.495	.500	.527	.716	.595	.538	.696	.513
f	.396	.380	.254	.249	.082	1.00 0	.172	.121	.160	.056	- .101	- .166	.183	.158
g	.606	- .064	.617	.700	.495	.172	1.00 0	.373	.582	.496	.629	.438	.546	.552
h	.493	.155	.487	.489	.500	.121	.373	1.00 0	.500	.352	.334	.332	.682	.419
i	.669	.080	.535	.569	.527	.160	.582	.500	1.00 0	.576	.572	.560	.575	.664
j	.485	.009	.480	.424	.716	.056	.496	.352	.576	1.00 0	.595	.635	.532	.557
k	.434	- .060	.552	.532	.595	- .101	.629	.334	.572	.595	1.00 0	.449	.518	.732
l	.494	- .065	.498	.336	.538	- .166	.438	.332	.560	.635	.449	1.00 0	.480	.498
m	.661	.096	.620	.620	.696	.183	.546	.682	.575	.532	.518	.480	1.00 0	.491
n	.564	- .017	.648	.558	.513	.158	.552	.419	.664	.557	.732	.498	.491	1.00 0

Determinant = 6.17E-005

After satisfying all the necessary tests of reliability of survey instrument, sample size adequacy and population matrix, the data set was subjected to factor analysis using principal component analysis (PCA), with varimax rotation. Prior to principal component analyses, the communalities involved were first established. The communalities show how much of the variance in the

variables has been accounted for by the extracted factors and is very useful in deciding which variables to finally extract. As indicated in **Table 6.2.3.3**, the average of the communalities of the variables after extractions was above 0.60.

Table 6.2.3.3: Communalities (challenges)

Challenges of innovative financing	Initial	Extraction
Adequacy of revenue	1.000	.744
Cost efficiency (delays/cost overruns)	1.000	.771
Issues of how funds are spent	1.000	.691
Sustainability of the strategy in the long run	1.000	.731
Fiscal prudence	1.000	.734
Excessive reliance on traditional sources	1.000	.791
Expectations of the populace	1.000	.717
Lack of long-term financing at fixed interests	1.000	.495
Exploring alternative methods	1.000	.644
Maintaining and replacing infrastructure assets	1.000	.688
Improving revenue collection	1.000	.673
Enforcement of laws	1.000	.682
Corruption	1.000	.692
Governance and institutional capacity issues	1.000	.650

Extraction Method: Principal Component Analysis.

Both the Guttman-Kaiser rule and the Cattell scree test were used in determining the number of factors to be extracted. Guttman-Kaiser rule suggests that only those factors with an eigenvalue larger than 1 should be retained, whilst the Cattell scree test suggests that all further components after the one starting the elbow should not be included. Applying these criteria on the number of

principal components to be extracted suggest that 3 components should be extracted for the challenges of innovative financing of infrastructure projects data set. As demonstrated in **Table 6.2.3.4**, and **Figure 6.2.3.1** three (3) components with eigenvalues greater than 1.0 were extracted.

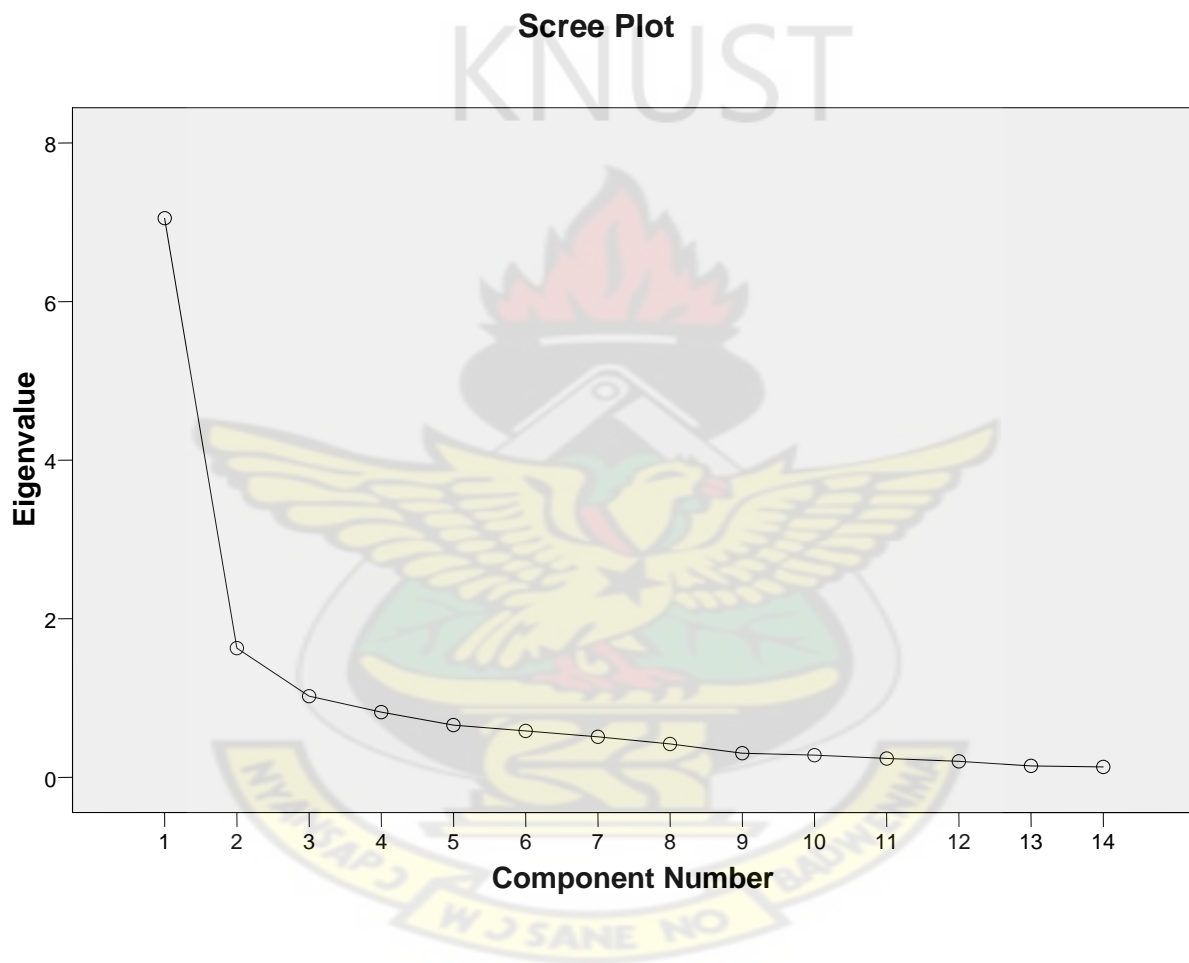


Figure 6.2.3.1: Scree Plot for the challenges variables

Table 6.2.3.4: Total Variance Explained (challenges)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.051	50.362	50.362	7.051	50.362	50.362	4.186	29.903	29.903
2	1.630	11.640	62.001	1.630	11.640	62.001	3.903	27.880	57.782
3	1.024	7.312	69.313	1.024	7.312	69.313	1.614	11.531	69.313
4	.823	5.875	75.189						
5	.659	4.704	79.893						
6	.585	4.180	84.073						
7	.511	3.649	87.722						
8	.421	3.006	90.728						
9	.304	2.171	92.899						
10	.279	1.995	94.895						
11	.238	1.700	96.595						
12	.202	1.440	98.035						
13	.144	1.029	99.064						
14	.131	.936	100.000						

Extraction Method: Principal Component Analysis.

The total variance explained by each component extracted is as follows: The first principal component (component 1) accounted for 50.362% of the total variance whilst the second principal component (component 2) explained 11.640% of the remaining variation not explained by the first component. The third component (component 3) accounted for 7.312%, of the remaining variation not explained by the first two components. Together, the 3 extracted components cumulatively explained 69.313% of the variation in the data set, and this meets the cumulative proportion of variance criterion, which says that the extracted components should together explain at least 50% of the variation.

Table 6.2.3.5: Component Matrix(Challenges)

Challenges	Component		
	1	2	3
Adequacy of revenue	.807	.295	-.073
Cost efficiency (delays/cost overruns)	.051	.700	.527
Issues of how funds are spent	.808	.031	-.192
Sustainability of the strategy in the long run	.759	.108	-.379
Fiscal prudence	.794	-.049	.318
Excessive reliance on traditional sources	.209	.827	-.251
Expectations of the populace	.771	-.042	-.348
Lack of long-term financing at fixed interests	.645	.202	.196
Exploring alternative methods	.802	.011	.033
Maintaining and replacing infrastructure assets	.743	-.215	.301
Improving revenue collection	.751	-.324	-.060
Enforcement of laws	.667	-.363	.324
Corruption	.812	.128	.128
Governance and institutional capacity issues	.788	-.103	-.138

Extraction Method: Principal Component Analysis.
a 3 components extracted.

Table 6.2.3.6: Rotated Component Matrix (challenges)

Challenges	Component		
	1	2	3
Adequacy of revenue	.685	.402	.336
Cost efficiency (delays/cost overruns)	-.188	.135	.847
Issues of how funds are spent	.717	.417	.048
Sustainability of the strategy in the long run	.821	.236	.044
Fiscal prudence	.352	.764	.163
Excessive reliance on traditional sources	.468	-.304	.693
Expectations of the populace	.781	.316	-.082
Lack of long-term financing at fixed interests	.371	.497	.332
Exploring alternative methods	.559	.564	.113
Maintaining and replacing infrastructure assets	.296	.775	-.002
Improving revenue collection	.524	.585	-.237
Enforcement of laws	.199	.789	-.139
Corruption	.524	.593	.257
Governance and institutional capacity issues	.642	.484	-.058

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 7 iterations.

6.2.4 DISCUSSION OF FACTOR ANALYSIS OF THE CHALLENGES VARIABLES

6.2.4.1 Component 1 - Meeting the Investment Needs

The first component extracted accounted for 50.362% of the total variance. From an examination of the relationships among the variables which loaded onto this component it has been named *meeting the investment needs*. The variables that loaded onto this component, with the respective eigenvalues of .685, .717, .821, .781, and .642, are; “*Adequacy of revenue*”, “*Issues of how funds are spent*”, “*Sustainability of the strategy in the long run*”, “*Expectations of the populace*”, and “*Governance and institutional capacity issues*”. The “*adequacy of revenue*” variable discusses the growing need for large amounts of investment in infrastructure assets and the capacity of the innovative financing methods to meet the challenge. The “*issues of how funds are spent*” variable is about the allocation of funds in a way that best reduces the infrastructure financing deficits. As indicated in the literature review an objective of innovative financing of infrastructure is enhancing / maximizing the capacity of existing resources, and this is exactly what the issues of how funds are spent is about. “*Sustainability of the strategy in the long run*” variable is about the challenge of devising stable and reliable innovative financing techniques which enhances the capacity of governing bodies to meet the huge financial requirement involve in the provision of infrastructure. The “*expectations of the populace*” variable is about the challenge of meeting peoples’ expectations with the use of innovative financing techniques. Obviously this is concerned with how to make the best strategic use of infrastructure finance from all sources to meet the investment needs. Finally, the “*governance and institutional capacity issue*” variable is also about enhancing efficiency and the financing capacity of the

system. This variable discusses the capacity of the institutions to manage and operate the innovative financing methods in efficient manner, and hence increases their financing capacities in meeting the investment challenge.

Literature on *meeting the investment needs* of infrastructure projects delivery with innovative financing techniques discusses issues such as getting the most out of each unit of money spent, and the use of diversified sources to raise the necessary resources. The lack of stable, adequate, long-term financial resources is considered the greatest impediment for infrastructure investment (Chism, et al., 2010). The challenge remains as to how governments can find creative ways to utilise resources to generate much needed revenue for infrastructure provision (Dirie, 2005). According to Crockatt and Prentice (1999), innovative financing should meet this challenge through the promotion of diversified approaches providing options for financing from the private and public sectors. This view was supported by researchers such as Cardone and Fonseca (2006), Ketkar (2009), and Chism (2009, 2010).

In meeting the investment needs governments should understand what investors seek, and how to develop high quality projects that meet this standard, in order to access private capital in an efficient way. From the view point of Trujillo, et al. (1997) the project cash flows from bankable projects have to be the source of finance. Cohen (2002) contributed to the debate by arguing that governments can meet the requirements of investors for protection against the risks inherent in long construction periods and uncertain consumer demand by using the solid backing of tax revenues to guarantee loans or by issuing lines of credit that protect private lenders from excessive risks.

6.2.4.2 Component 2 – Implementation

This component accounted for 11.640% of the remaining variation not explained by the first component, and can be deduced from the observation of the relationships among the variables which loaded onto it to be about the challenge of adhering to the established procedures in implementing the innovative financing method adopted. The variables which loaded onto this factor are; *'fiscal prudence'*, *"exploring alternatives"*, *"maintaining and replacing infrastructure assets"*, *"improving revenue collection"*, *"enforcement of laws"*, *"corruption"* and *"lack of long term financing at fixed interests"*. The *"fiscal prudence"* variable with an eigenvalue of .764, is about following established procedures and being discipline with the use of funds so as not to create deficits. For instance, it came up during the interviews that contracts were often awarded without due consideration of available funds generated by the mechanisms. *"Exploring alternative methods"* with an eigenvalue of .564, discusses the challenge of implementing and exploring new innovative financing techniques. Innovative financing as discussed in the literature is relative with time, so while implementing a choosing method there is also the need to explore new alternatives with time, and this is where the challenge is. *"Maintaining and replacing infrastructure assets"* variable with an eigenvalue of .775, is about the ease with which funds are applied to maintenance work. Often this type of necessary investment need is neglected owing to the fact that people do not readily appreciate the use of funds. This presents a huge challenge for the successful implementation of innovative financing of infrastructure projects in respect of maintenance work. The *"Improving revenue collection"* variable with eigenvalue of .585 discusses whether or not the adoption of the innovative financing method help expands the revenue base. This is because the implementation of new

methods can lead to laxity in revenue mobilization using existing methods. “*Enforcement of laws*” discusses the difficulty of implementing the new system, whilst “*corruption*” talks about the challenge of preventing corrupt people who will try to take advantage of the innovative financing approach in the course of implementation. The “*enforcement of laws*” and “*corruption*” variables had eigenvalues of .789 and .593 respectively. Finally, the “*Lack of long-term financing at fixed interests*” variable with an eigenvalue of .497 (which is not too significant), is about the difficulty in implementing innovative financing techniques due to unavailability of long-term financing at low interest rates. As was noted in the literature the financing of infrastructure projects usually involves the commitment of huge sums of money for long periods of time (depending on the key characteristics of the infrastructure in question). Another point worth mentioning is the fact that the concept of innovative financing of infrastructure projects is often about the involvement of private capital. Thus the lack of long-term capital at fixed interest presents serious challenges in the implementation of innovative financing initiatives. Clearly the above variables discuss challenges associated with the implementation aspect of innovative financing of infrastructure projects.

Literature on ***implementation*** of innovative financing of infrastructure projects discusses issues such as enhancing public sector efficiency and public education. Researchers such as Trujillo, et al. (1997), Suresh (2004), Ploeg and Casey (2006), and Chism, et al. (2010), make reference to the issue of governmental effectiveness. They discussed issues such as insufficient financial and managerial resources on the part of public sector bodies, and are of the agreement that the successful implementation of innovative financing techniques depend on better public oversight, accountability, visibility, and transparency in the financing of infrastructure. According to Thay

(2007), there is the need to understand the implementation of each tool and all the implications. Thus there should be more focus on training, increased transparency and accountability, as well as taking short-term political considerations out of the process of planning how best to finance long-term infrastructure needs.

The willingness of governments to embrace methods that differ from conventional approaches to financing of infrastructure is also part of the implementation challenge. Governments must resist the temptation to pick only one or two of the tools that they like best. If innovative financing of infrastructure is to be successful, governments must carefully assess their infrastructure needs, scan the list of available tools, and then put into play those tools that offer the best solutions for financing infrastructure (Ploeg and Casey, 2006).

6.2.4.3 Component 3 – Revenue Mobilization

The two variables which loaded on the third factor are “*cost efficiency*” and “*excessive reliance on traditional sources*” with eigenvalues of .847 and .693 respectively. The “*cost efficiency*” variable discusses the challenge of finding a method which is relatively easier to administer so that its use in financing infrastructure will generate enough revenue with ease at less cost, and not lead to delays and cost overruns usually associated with traditional funding methods. The second variable which loaded onto this component (*excessive reliance on traditional sources*), is about the challenge of avoiding overdependence on known sources of finance, and hence the ability to opt for alternative ways of raising additional revenue. Clearly, the two variables discussed above have in common the challenge of revenue mobilization aspect of the whole idea of innovative financing.

Component 3 (***Revenue Mobilization***) accounted for 7.312%, of the remaining variation not explained by the first two components. Discussions on revenue mobilization in innovative financing of infrastructure projects delivery centre on the use of combinations of various sources of financing (Cohen, 2002; Dirie, 2005; Ploeg and Casey, 2006; Guillory, 2007; Cohen, 2010). The challenge of revenue mobilization is usually met by increasing the revenue yield of traditional or existing finance tools or securing funds at the lowest possible cost. This is typically accomplished by changing the way these tools are used, and thus overcoming certain political challenges or barriers to their increased usage.

From the perspectives of Cohen (2002), Dirie (2005) and Guillory (2007) the issue of revenue mobilization is also about governments becoming more innovative in the way they can tap into long-term private capital from banks and investors to finance infrastructure. The inducement of private investment in infrastructure is achieved with the creation of financial terms and conditions that satisfy the demands of the private capital markets in terms of their risk, exposure and coverage (Cohen, 2002). The creation of bankable infrastructure projects is key (Dirie, 2005).

6.3 STRATEGIC ISSUES OF INNOVATIVE FINANCING OF INFRASTRUCTURE

PROJECT DELIVERY

The analysis of the strategic issues of innovative financing variables also starts with descriptive statistics, followed by the chi-square test, and finally factor analysis.

6.3.1 DESCRIPTIVE STATISTICS

The results of the descriptive statistics are presented in **Table 6.3.1**. Once again a variable was arbitrary considered important if it had a mean of 3.5 or more on the five-point Likert rating scale, (Field,2005) cited in Owusu and Badu (2009).

From **Table 6.3.1** all the variables have mean values above the accepted population mean of 3.5, it may therefore be concluded that they constitute the strategic issues of innovative financing of infrastructure projects in Ghanaian context. The standard error associated with all the means were relatively closer to zero suggesting that the sample chosen is an accurate reflection of the population. Again, the fact that the standard deviations of all (except ‘the principle of cost recovery from users’) are less than 1.0 signals that, there is little variability in the data collected and consistency in agreement among the respondents.

The standard deviation of the ‘principle of cost recovery from users’ variable, 1.072, is slightly above 1.0. This is not surprising because when it comes to cost recovery from users some researchers including Cohen (2002), are of the view that users of infrastructure assets already contribute to its financing in the form of the tax that is used to settle dept/upfront payment and should therefore not be levied again. For others researchers such Mor and Sehwat (2006), user

charges should (for equity considerations) be imposed to recover costs from those who directly benefit from the use of the infrastructure asset. The variability and inconsistency in the responses for the ‘principle of cost recovery from users’ variable clearly attest to the fact that the principle of user fees is still debatable.

Again it may confidently be concluded on the basis of the descriptive statistics alone that the variables identified as the strategic issues of innovative financing of infrastructure projects delivery in Ghana through the literature review and the interviews reflect the views of the respondents.



Table 6.3.1: Descriptive Statistics (strategic issues)

The strategic issues identified	N Statistic	Mean		Std. Deviation Statistic
		Statistic	Std. Error	
Revenue potential	61	4.48	.086	.673
Issues of how funds are spent	61	4.13	.108	.846
Sustainability of the strategy in the long run	61	4.03	.093	.730
Legal and regulatory implications	61	4.00	.105	.816
Strategies for allocation of funding	61	3.98	.092	.719
Governance and institutional capacity issues	61	3.95	.082	.644
Capacity to overcome cash flow shortages	61	3.92	.085	.666
Appropriateness of project type	61	3.92	.097	.759
Viability of sources of financing	61	3.90	.087	.676
Diversification	61	3.80	.084	.654
Demand management	61	3.77	.082	.643
Ease of compliance	61	3.66	.112	.873
The principle of cost recovery from users	61	3.57	.137	1.072
Valid N (listwise)	61			

6.3.2 TEST OF HYPOTHESES

The chi-square test of significance was also conducted for the strategic issues of innovative financing of infrastructure variables to confirm the findings from the descriptive statistics. In this case the *null hypotheses* were stated that “the strategic issues of innovative financing of infrastructure variables identified by the review and in-depth interviews are not important in the Ghanaian context”; and the *alternative hypotheses* stated that “the strategic issues of innovative financing of infrastructure variables identified by the review and in-depth interviews are important in the Ghanaian context”. Below are the details of the test:

Hypotheses

H_0 : “the strategic issues of innovative financing of infrastructure variables identified by the review and in-depth interviews are not important in the Ghanaian context”.

[i.e., the population mean, U_0 , was less than or equal to 3.5. ($H_0: U \leq U_0$)]

H_a : “the strategic issues of innovative financing of infrastructure variables identified by the review and in-depth interviews are important in the Ghanaian context”.

[i.e., the population mean, U_0 , was more than 3.5. ($H_0: U > U_0$)]

Significance Level

$\alpha = 0.05$

Rejection Region

Reject the null hypothesis if $p\text{-value} \leq 0.05 = \alpha$.

Table 6.3.2: Test of hypotheses (strategic issues)

Strategic issue of innovative financing of infrastructure	Chi-square	df	Asymp. Sig. <i>p</i> values	Decision
Revenue potential	20.689a	2	.000	Reject
Diversification	54.213b	3	.000	Reject
Issues of how funds are spent	21.164b	3	.000	Reject
Sustainability of the strategy in the long run	32.443b	3	.000	Reject
Strategies for allocation of funding	6.918a	2	.031	Reject
The principles of cost recovery from users	21.049c	4	.000	Reject
Demand management	55.393b	3	.000	Reject
The capacity to overcome cash flow shortages	56.049b	3	.000	Reject
Viability of these sources of financing	52.246b	3	.000	Reject
Appropriateness to project type	30.344b	3	.000	Reject
Legal and regulatory implications	25.492b	3	.000	Reject
Governance and institutional capacity issues	18.328a	2	.000	Reject
Ease of Compliance	15.918b	3	.001	Reject

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 20.3.

b 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 15.3.

c 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 12.2.

Just as before, the hypotheses were tested using the Chi Square test at the conventional p-values of $p \leq 0.05$. The rule for the acceptance or rejection of a hypothesis is that if a p-value of > 0.05 is

achieved, the hypothesis is accepted but if a p-value of ≤ 0.05 is achieved, the hypothesis is rejected (Field, 2005). The results of the chi square tests presented in **Table 6.3.2** above indicate that all the strategic issues of innovative financing of infrastructure projects variables identified recorded p-values of ≤ 0.05 . Thus at the 0.05 level of significance, there is not enough evidence to conclude that the variables identified are not the important in the Ghanaian context. The test has confirmed the findings on the strategic issues when the descriptive statistics were used.

6.3.3 FACTOR ANALYSIS

Factor analysis was used for data reduction to establish which of the 13 variables could be measuring aspects of the same underlying dimensions. The data set was first subjected to the preliminary tests, the results of which are presented in **Tables 6.3.3.1** and **6.3.3.2**. The results of these tests as indicated in the tables show that the data set is appropriate for factor analysis.

Table 6.3.3.1: KMO and Bartlett's Test (strategic issues)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.844
Bartlett's Test of Sphericity	484.369
Approx. Chi-Square	78
Df	.000
Sig.	

Table 6.3.3.2: Correlation Matrix (strategic issues)

	a	b	c	d	e	f	g	h	i	j	k	l	m
a	1.00 0	.519	.591	.409	.671	.401	.372	.386	.471	.469	.697	.478	.340
b	.519	1.00 0	.409	.468	.419	.449	.406	.460	.446	.236	.500	.412	.317
c	.591	.409	1.00 0	.479	.497	.412	.455	.463	.489	.406	.531	.624	.333
d	.409	.468	.479	1.00 0	.319	.466	.514	.417	.412	.246	.616	.642	.358
e	.671	.419	.497	.319	1.00 0	.315	.316	.276	.511	.670	.625	.539	.389
f	.401	.449	.412	.466	.315	1.00 0	.702	.674	.493	.182	.381	.477	.642
g	.372	.406	.455	.514	.316	.702	1.00 0	.579	.523	.371	.476	.536	.391
h	.386	.460	.463	.417	.276	.674	.579	1.00 0	.352	.250	.368	.574	.696
i	.471	.446	.489	.412	.511	.493	.523	.352	1.00 0	.471	.544	.563	.422
j	.469	.236	.406	.246	.670	.182	.371	.250	.471	1.00 0	.645	.537	.384
k	.697	.500	.531	.616	.625	.381	.476	.368	.544	.645	1.00 0	.603	.351
l	.478	.412	.624	.642	.539	.477	.536	.574	.563	.537	.603	1.00 0	.592
m	.340	.317	.333	.358	.389	.642	.391	.696	.422	.384	.351	.592	1.00 0

a Determinant = .000

After satisfying all the necessary tests of reliability of survey instrument, sample size adequacy and population matrix, the data set was subjected to factor analysis using principal component analysis (PCA), with varimax rotation. Prior to principal component analyses, the communalities involved were also first established. As indicated in **Table 6.3.3.3**, the average communalities of the variables after extractions were above 0.60.

Table 6.3.3.3: Communalities (strategic issues)

	Initial	Extraction
Revenue potential	1.000	.678
Diversification	1.000	.603
Issues of how funds are spent	1.000	.563
Sustainability of the strategy in the long run	1.000	.664
Strategies for allocation of funding	1.000	.772
The principle of cost recovery from users	1.000	.785
Demand management	1.000	.623
Capacity to overcome cash flow shortages	1.000	.774
Viability of sources of financing	1.000	.532
Appropriateness of project type	1.000	.817
Legal and regulatory implications	1.000	.779
Governance and institutional capacity issues	1.000	.688
Ease of compliance	1.000	.822

Extraction Method: Principal Component Analysis.

Like before, both the Guttman-Kaiser rule and the Cattell scree test were used in determining the number of factors to be extracted. Applying these criteria on the number of principal components to be extracted for the strategic issues of innovative financing of infrastructure projects data set, the Guttman-Kaiser rule indicated that 2 components should be extracted, while the Cattell scree test suggested 3 components should be extracted. So the analysis was done again specifying the number of components to be extracted as 3.

Table 6.3.3.4: Total Variance Explained (First instance)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.636	51.044	51.044	6.636	51.044	51.044	4.145	31.887	31.887
2	1.538	11.829	62.873	1.538	11.829	62.873	4.028	30.986	62.873
3	.927	7.133	70.006						
4	.738	5.675	75.681						
5	.659	5.066	80.747						
6	.569	4.375	85.122						
7	.502	3.861	88.983						
8	.417	3.209	92.192						
9	.313	2.410	94.602						
10	.234	1.797	96.399						
11	.185	1.423	97.822						
12	.161	1.238	99.060						
13	.122	.940	100.000						

Extraction Method: Principal Component Analysis.

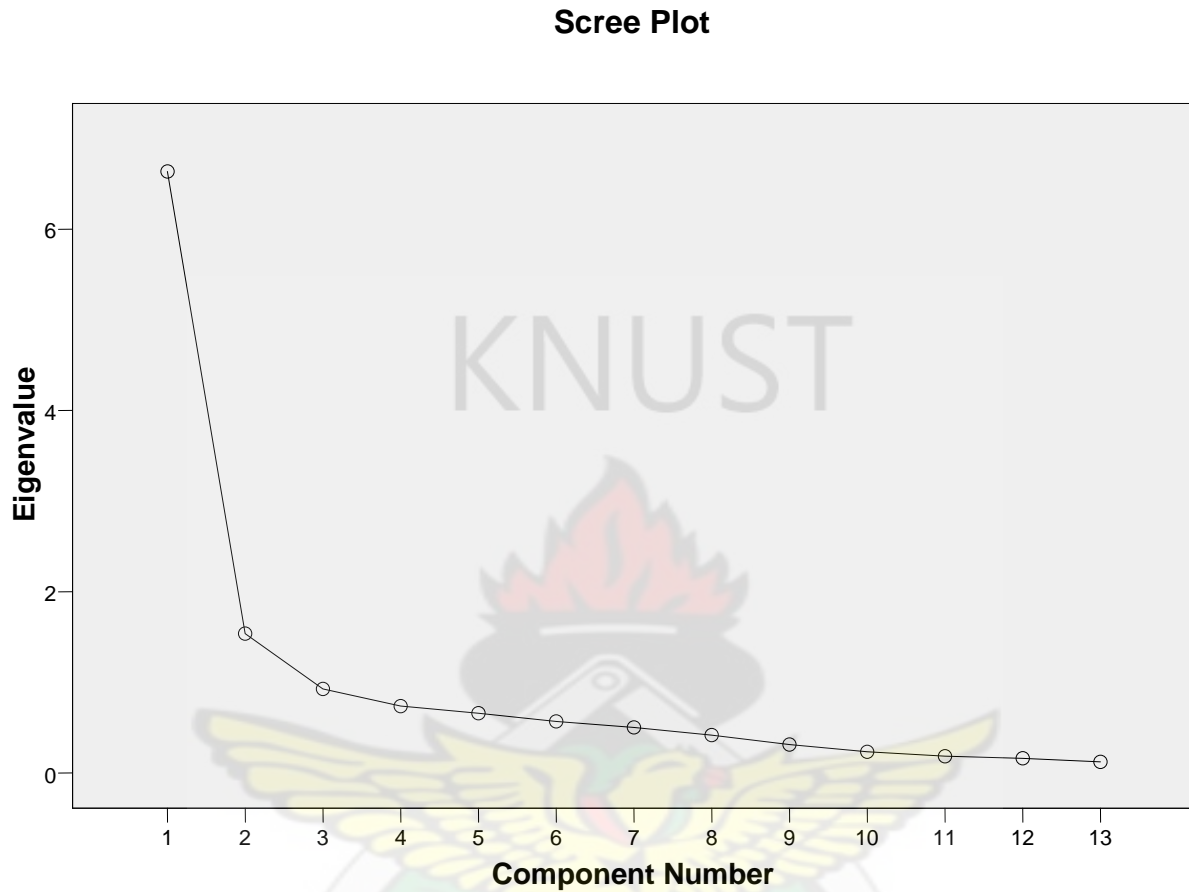


Figure 6.3.3.1: Scree Plot for the strategic the issues variables

The total variance explained by each component extracted is as follows: The first principal component (component 1) accounted for 51.044% of the total variance whilst the second principal component (component 2) explained 11.829% of the remaining variation not explained by the first component. The third component (component 3) accounted for 7.133%, of the remaining variation not explained by the first two components. Together, the 3 extracted components cumulatively explained 70.006% of the variation in the data set, and this also meets

the cumulative proportion of variance criterion, which says that the extracted components should together explain at least 50% of the variation.

Table 6.3.3.5: Total Variance Explained (Second instance)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.636	51.044	51.044	6.636	51.044	51.044	3.221	24.775	24.775
2	1.538	11.829	62.873	1.538	11.829	62.873	3.062	23.554	48.329
3	.927	7.133	70.006	.927	7.133	70.006	2.818	21.677	70.006
4	.738	5.675	75.681						
5	.659	5.066	80.747						
6	.569	4.375	85.122						
7	.502	3.861	88.983						
8	.417	3.209	92.192						
9	.313	2.410	94.602						
10	.234	1.797	96.399						
11	.185	1.423	97.822						
12	.161	1.238	99.060						
13	.122	.940	100.000						

Extraction Method: Principal Component Analysis

Table 6.3.3.6: Component Matrix (Strategic Issues)

Strategic Issues of Innovative Financing of Infrastructure	Component		
	1	2	3
Revenue potential	.736	-.336	-.154
Diversification	.647	.047	-.427
Issues of how funds are spent	.725	-.116	-.152
Sustainability of the strategy in the long run	.688	.121	-.420
Strategies for allocation of funding	.706	-.487	.191
The principle of cost recovery from users	.709	.531	.029
Demand management	.716	.320	-.084
Capacity to overcome cash flow shortages	.698	.512	.156
Viability of sources of financing	.724	-.087	.030
Appropriateness of project type	.631	-.496	.416
Legal and regulatory implications	.796	-.353	-.148
Governance and institutional capacity issues	.823	.015	.106
Ease of compliance	.666	.365	.496

Extraction Method: Principal Component Analysis.
a 3 components extracted.

Table 6.3.3.7: Rotated Component Matrix (Strategic Issues)

Strategic Issues of Innovative Financing of Infrastructure	Component		
	1	2	3
Revenue potential	.609	.113	.542
Diversification	.180	.221	.722
Issues of how funds are spent	.450	.264	.539
Sustainability of the strategy in the long run	.155	.300	.742
Strategies for allocation of funding	.835	.132	.240
The principle of cost recovery from users	.058	.791	.395
Demand management	.165	.598	.487
Capacity to overcome cash flow shortages	.115	.824	.285
Viability of sources of financing	.500	.360	.390
Appropriateness of project type	.887	.177	.012
Legal and regulatory implications	.659	.137	.571
Governance and institutional capacity issues	.518	.520	.387
Ease of compliance	.334	.843	-.014

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 6 iterations.

6.3.4 DISCUSSION OF FACTOR ANALYSIS OF THE STRATEGIC ISSUES

VARIABLES

6.3.4.1 Component 1 – Appropriateness of the Method

Five (5) variables loaded onto this component which accounted for 51.044% of the total variance: *‘Revenue potential,’ ‘Viability of sources of financing,’ ‘Legal and regulatory*

implications', '*Strategies for allocation of funding*', and '*Appropriateness of project type*' with eigenvalues of .609, .835, .500, .887, and .659 respectively. From the literature "*Revenue potential*" is about the sufficiency of the method to meet the financing needs at various politically acceptable rates. "*Viability of sources of financing*" discusses the ease with which the innovative financing method can overcome legal, institutional, and political or other types of barriers that could stand in the way of implementation. "*Legal and regulatory implications*" considers whether the method shall require changes in legislation to pave for its implementation. Whilst "*Appropriateness of project type*" is about recognizing which techniques are suitable for what type of project (taking into consideration the key characteristics of the project). Finally, "*Strategies for allocation of funding*" is also about apportioning of funds for new development and maintenance projects. Ploeg and Casey (2006, 2008) argues that it is politically easier to finance new development than maintenance work because people readily appreciate new development. Thus it is prudent to also assess the method alongside allocation of funding in determining the suitability of the innovative financing method. Would the mechanism for instance continue to generate enough revenue if it is applied to maintenance work and hence suitable for financing the maintenance of infrastructure projects? Clearly from the above explanations the use of ***appropriateness of the method*** for component 1 is in the right direction.

As noted earlier this component - ***appropriateness of the method***, alone accounted for 51.044% of the total variance. In innovative financing, financing methods are not really "innovative", instead, this refers to, financial mechanisms bundled to deliver projects more timely, efficiently, and on value for money basis (Cohen, 2010). Thus in order to bridge the recognized financing gap authorities should carefully consider the options for becoming more innovative in identifying

and utilising various resources (Dirie, 2005). According to Ploeg and Casey (2006), the key characteristics of infrastructure are critical to determining the applicability and suitability of a particular innovative financing tool. Suresh (2004) also argued that the financial requirements at various stages of the project should be considered when discussing the appropriateness of the method. Innovative financing of infrastructure solutions are continually being devised and applied in other jurisdictions. Some innovative financing techniques allocate costs to people benefiting from the use of the infrastructure. Some may increase accountability by clear allocation of funds while others may increase flexibility through contractual arrangements or partnerships. Public-private partnerships for instance have the potential to reduce costs and expedite project delivery through limiting processes as well as the assignment of risks to the partner that is in the best position to manage the risk effectively. What is required is a close match between the infrastructure required and the most efficient and effective innovative financing tool.

6.3.4.2 Component 2 – Pricing and Management

The review of the literature indicated that one of the key objectives of innovative financing of infrastructure projects is to convert tax supported infrastructure to blended or self financing infrastructure. In self financing infrastructure the strategy has to do with setting of appropriate prices. Looking at the variables that loaded onto component 2, “*The principle of cost recovery from users*”, “*Ease of compliance*”, and “*Demand management*”, with eigenvalues of .791, .843, and .598 are all about pricing. “*The principle of cost recovery from users*” is about how the mechanism will ensure that users of infrastructure assets compensate the system in proportion to their use of it. In other words how the prices users pay compensate for their use of the

infrastructure asset. “*Ease of compliance*” discusses the extent to which the method minimizes evasion compared to others. It discusses how the pricing or method of raising the money is such that it is difficult to evade. “*Demand management*” is about the extent to which the method of innovative financing of infrastructure projects will promote efficient use of the infrastructure asset. It discusses the use of pricing to regulate people's demand and check unnecessary use of the system which for example may lead to frequent congestions on roads. Clearly these 3 variables are about **pricing**.

The remaining variables that loaded onto component 2; “*Overcoming cash flow shortages*” and “*Governance and institutional capacity issues*” with eigenvalues of .824 and .520 respectively have been tagged **management**. “*Overcoming cash flow shortages*” has to do with the management of innovative financing mechanism to provide financing in a way that avoids cash flow shortages. For example in providing supplementary financing these systems are often set up to provide bridge financing. “*Governance and institutional capacity issues*” is about whether the institutions that will implement and manage the system are in a position to do so. For example the use of PPP as innovative financing mechanism usually requires public officials who are well equipped to be able to handle the system.

This component (**Pricing and Management**) accounted for 11.829% of the remaining variation not explained by the first component. From the literature the issue of **pricing** in innovative financing of infrastructure projects rests on the marketability of the infrastructure asset in question, and to some degree on the user profile. Marketability is a critically important characteristic that determines whether an infrastructure asset can produce sufficient cash flow to

be self-financing (marketable), or whether it must be supported by government involvement through a tax subsidy (non-marketable). It is also important to know how and to what extent different groups will use an infrastructure asset. The possibility that lower income individuals may tend to consume more relative to higher income users, or the reverse need to be assessed. Such an assessment should be carried out before decisions on user fees, for example, can be made. Often government officials and private lenders have different objectives, with the former seeking to assure public benefits and the latter looking to maximize profits. According to Cohen (2002), these are not necessarily incompatible, but they create the challenge of innovative finance, which is to join public and private resources in ways that maximize overall returns. On the issue of pricing researchers are also in agreement that the price set should reflect the true cost of the infrastructure by using life cycle costing.

The issue of **management** is about financial management expertise. According to Chism, et al. (2010), ineffective control, accountability, and transparency measures are hurting the ability of governments to deliver infrastructure. Obviously the need to tap into innovative forms of financing for infrastructure development necessitates the development of a broader range of skills for local government employees (Dirie, 2005). Dirie (2005) is of the view that the decision to use innovative financing mechanisms should provide public sector employees with the incentives to perform their functions effectively and manage their fiscal and financial affairs prudently in order to be able to attract significant investment from the private sector.

6.3.4.3 Component 3 – Sustainability

The third component which accounted for 7.133%, of the remaining variation not explained by the first two components has been labelled “*Sustainability*”. The identified strategic issues which loaded onto this component are “*Diversification*”, “*Issues of how funds are spent*”, and “*Sustainability*” with eigenvalues of .722, .539, and .742 respectively. “*Diversification*” according to the literature is about the capacity of the innovative financing method to bring in additional financing, while boosting the capacity to generate further resources from the traditional sources. “*Issues of how funds are spent*” deals with accountability, and better performance to extend the value of existing resources (investment efficiency). “*Sustainability of the strategy in the long run*” is about whether the revenue it produces will be stable and reliable. Clearly innovative financing of infrastructure methods that talk about capacity to bring in additional financing while boosting the capacity of traditional sources to generate further resources, investment efficiency, and sustainability, are all about stability and reliability.

The *sustainability* of innovative financing of infrastructure projects according to literature, is about stability and reliability of the innovative financing technique. In respect of stability and reliability of innovative financing of infrastructure, researchers advocate for the adoption of user fees based on the principle of life cycle costing. Accordingly the link between cost and use should be well-established in the public’s mind (RCCAO, 2006). In line with this, Suresh (2004) laid emphasis on the principle of full cost recovery for improving the sustainability of innovative financing of infrastructure projects delivery. The researchers argued that providers should opt for user fees to manage demand for infrastructure and to provide more sustainable alternatives. Ploeg (2006) summarized the whole issue with the argument that the greater the degree to which

an innovative financing tool allocates the costs of infrastructure among its various users, and the greater the degree to which it establishes a link between those who benefit from the infrastructure and those who pay for it, the more sustainable infrastructure investments will become. The use of the principle of cost recovery from users is however dependent on the marketability of the infrastructure asset, the availability of demand, and the ease with which demand can be forecasted.

6.4 CHAPTER SUMMARY

This chapter has been devoted to the analyses and discussions of the results obtained from the field survey. It began with a brief discussion of the survey questionnaires and descriptive statistics of the results obtained from the field. The chapter was concluded with factor analyses of the challenges and strategic issues of innovative financing of infrastructure projects variables and the discussions of the results of the analyses.

The descriptive statistics largely confirmed the variables which were identified in the literature and also through the exploratory interviews. The factor analyses of these variables resulted in 3 components for both the challenges and the strategic issues of innovative financing of infrastructure project variables, and these were appropriately named and discussed.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATION

7.0 INTRODUCTION

This dissertation which focused on strategic issues of innovative financing of infrastructure projects delivery in Ghana is divided into seven (7) independent but interrelated chapters. The main introduction to the research was covered in Chapter One. The review of literature on the topic which covered background discussions, conceptual framework, and overview on innovative financing of infrastructure in Ghana was captured in Chapters Two, Three, and Four. In Chapter Five, the methodology adopted for the study including the philosophical positions, research design, and research strategy were discussed. The research process was in two main phases: in-depth exploratory interviews and survey questionnaires. Chapter Six presented the empirical analysis and provided detailed discussions on the survey results. This chapter (Chapter Seven) summarises the issues addressed throughout the study. It begins with a summary of how the research objectives were achieved, followed by contributions of this research to knowledge. The chapter concludes with recommendations for further research that can be conducted based on the conclusions and limitations of the study.

7.1 ACHIEVING THE RESEARCH OBJECTIVES

This research was initiated with the primary aim of identifying and analysing the strategic issues of using innovative financing for infrastructure projects delivery in Ghana in order to prescribe policy directions for improvement. In order to achieve the stated aim, four research objectives were set in Section 1.4. Objective 1 was achieved mainly through literature reviews. Objectives 2

and 3 were achieved through the literature reviews, the exploratory interviews and the survey questionnaires which were conducted. The empirical analysis and discussions on the results provide the foundations for the achievement of objective 4. Below are discussions on how the objectives were achieved.

7.1.1 Objective 1:

The first objective was to conduct a critical review of literature on the conceptual underpinnings of innovative financing of infrastructure projects delivery.

Consequently, literature on innovative financing of infrastructure projects was reviewed covering a number of important issues. The review began with discussions on working definitions of infrastructure and innovative financing of infrastructure and covered such topics as types, characteristics, and role of infrastructure in national development. The literature review also discussed the approaches to provision of infrastructure, and extended the discussion to cover the need for innovative financing of infrastructure, the strategic objectives of innovative financing of infrastructure projects, the conceptual framework of innovative financing of infrastructure projects delivery, and finally concluded with an overview of innovative financing of infrastructure projects in Ghana.

The review observed that, across the globe nations are turning to innovative financing of infrastructure because the traditional source of financing are inadequate, and have consequently led to huge and growing infrastructure deficits. As a result there have been many studies on innovative financing of infrastructure with the ultimate aim of solving the infrastructure deficit, but not much has been done on the strategic issues of innovative financing of infrastructure

projects delivery in the Ghanaian context. It was also observed that the majority of the works are on the applicability of a particular innovative financing tool with works on PPPs dominating the discussions on innovative financing of infrastructure projects.

The review revealed that the concept of innovative financing is flexible and evolving, and is relative with respect to time, geography and the type of project. The consensus appears to be that innovative financing of infrastructure is about the combination of private financing and public funding in which the financial mechanisms are bundled to deliver projects more timely, efficiently, and on value for money basis. The literature review also indicated that the concept includes the application of user fees to manage demand for infrastructure and to provide more sustainable financing alternatives and that most innovative financing mechanisms are enabled with legislative changes. In addition to user fees various strategies such as matching the key characteristics of the infrastructure with the innovative financing tools, recognising the non-exclusivity in use of the innovative financing tools, and the identification of the goals of the infrastructure project, are used.

In sum the review of the literature revealed that innovative financing of infrastructure projects revolves around such measures as: new or non-traditional sources of revenue, new financing mechanisms designed to leverage resources, new fund management techniques, demand management techniques, and new institutional arrangements.

7.1.2 Objective 2:

To identify the challenges of innovative financing of infrastructure projects delivery in Ghana.

With the background knowledge on the conceptual maps of innovative financing of infrastructure projects gain from the literature review, in-depth exploratory interviews were conducted to identify the challenges of innovative financing of infrastructure in the Ghanaian context. Consequently, fourteen (14) variables were identified as the challenges of innovative financing of infrastructure projects; and further tested on a larger number of professionals in the financing/provision of infrastructure projects in Ghana.

After the initial descriptive analysis of the field data, it was hypothesized that “the variables identified as the challenges of innovative financing of infrastructure project delivery were not critical in the Ghanaian context”. The chi-square test failed to accept the hypotheses for all the variables except one variable “*Adequacy of revenue*”. An explanation for the acceptance of the “*Adequacy of revenue*” variable as not being a critical challenge of innovative financing of infrastructure projects delivery in Ghana was provided. It was further suspected that, the relatively large number of the dependent variables (i.e. 14 challenges of innovative financing of infrastructure variables) could be measuring the same underlying effect. Factor analysis (Principal Component Analysis) was applied for data reduction to establish which of the variables could be measuring aspects of the same underlying dimensions. This resulted in three (3) components (*meeting the investment needs, implementation, and revenue mobilization*) which were subsequently discussed.

7.1.3 Objective 3:

To identify and analyse the strategic issues that influence innovative financing of infrastructure projects delivery in Ghana.

As in the case of the second objective, the in-depth exploratory interviews were conducted to identify the strategic issues of innovative financing of infrastructure in the Ghanaian context (with the background knowledge on the conceptual maps of innovative financing of infrastructure projects gain from the literature review). Consequently, thirteen (13) variables were identified as the strategic issues of innovative financing of projects; and further tested on a larger number of professionals in the financing/provision of infrastructure in Ghana.

Again after the initial descriptive analysis of the field data, it was hypothesized that “the variables identified as the strategic issues of innovative financing of infrastructure project delivery were not important in the Ghanaian context”. The chi-square test failed to accept the hypotheses for all the variables. It was again suspected that, the relatively large number of the dependent variables (i.e. 13 strategic issues of innovative financing of infrastructure variables) could be measuring the same underlying effect. Factor analysis (Principal Component Analysis) was applied for data reduction to establish which of the variables could be measuring aspects of the same underlying dimensions. This also resulted in three (3) components (*appropriateness of the method, pricing and management, and sustainability*) which were subsequently discussed.

7.1.4 Objective 4:

To prescribe and describe policy guidelines for the improvement of innovative financing of infrastructure projects in Ghana.

The fourth and final objective was set to prescribe and describe policy directions based on the findings of the study, thus the strategic issues of innovative financing of infrastructure projects delivery in Ghana. The recommendations are discussed separately in Section 7.3.

7.2 CONTRIBUTION TO KNOWLEDGE

As was observed earlier, nations across the globe are turning to innovative financing of infrastructure because the traditional source of financing are inadequate, and have consequently led to huge and growing infrastructure deficits (Foster, 2008; World Bank, 2008; Sihombing, 2009). As a result there have been many studies on innovative financing of infrastructure with the ultimate aim of solving the infrastructure deficit; however, not much has been done on the strategic issues of innovative financing of infrastructure projects delivery in the Ghanaian context.

The identification of strategic issues therefore provides important guidelines to infrastructure providers and investors wishing to use or invest in innovative financing of infrastructure projects. Subsequently, these findings may help infrastructure providers to better appreciate the concept of innovative financing and advance their use of this approach to finance the needed infrastructure for development. For the investors wishing to invest in innovative financing of infrastructure projects these findings may help them to better appreciate the issues involved such as the extent of risks and governments guarantees. The identification of the challenges and strategic issues of

innovative financing of infrastructure projects in Ghana will further assist project managers in drafting and managing contracts for infrastructure projects financed with innovative financing techniques through enhanced appreciation of the issues surrounding these sources of finance.

Thus, a contribution to knowledge from the findings reported in the dissertation is the identification of the challenges and strategic issues that can be modelled or incorporated into standards for the assessments of the applicability of innovative financing mechanisms for infrastructure projects delivery in Ghana.

The contribution to knowledge of this research could also be viewed in respect of the potential it may have in the future if further work is carried out on the topic. The use of factor analysis for example exposed the underlying dimensions of the various challenges and strategic issues of innovative financing of infrastructure projects delivery. The identified factors may be tested on a different sample with confirmatory factor analysis for example.

7.3 RECOMMENDATIONS

The primary aim of this study is to identify and analyse the strategic issues of using innovative financing for infrastructure projects delivery in Ghana in order to prescribe policy directions for improvement. Consequently an objective was set to prescribe and describe policy directions based on the findings of the study. The following recommendations are therefore prescribed to assist in the use of innovative financing of infrastructure projects in Ghana.

- Whenever an innovative financing method is proposed for any infrastructure project it should thoroughly be assessed along the issues identified in order to be able to overcome obstacles that may come in the way of implementation. For example, the Government of Ghana Affordable Housing Project has not been successful mainly because the innovative financing option that was employed was not sustainable (Affordable Housing Office, Ministry of Water Resources, Works and Housing).
- Now that it has become imperative to use innovative financing of infrastructure methods in Ghana, seminars should be organised to educate staff of the MMDAs involved in the financing/provision of infrastructure projects on the identified issues.
- Project management education should include modules in the identified strategic issues of innovative financing of infrastructure to provide project managers with critical awareness of the issues and debates surrounding the financing of infrastructure projects.

7.4 LIMITATIONS OF THE RESEARCH

The main limitations of this research which must be acknowledged have to do with the scope and the research process. These shortfalls which provide the basis for further studies are as follows:

- The limitation of the survey to the Ashanti Region alone may affect the generalizations of the findings.
- The possibility of sampling and measurement errors and the effects of these errors on the data collected, analysis undertaken and the conclusions drawn.

- In addition to the scope the relatively small sample size used for the study should also be seen as a limitation, although the initial tests for sample size adequacy were favourable (for the factor analyses).

7.5 DIRECTIONS FOR FUTURE RESEARCH

This research exposes a number of areas which need research attention. The following recommendations are therefore made for future research:

- This dissertation used survey questionnaire to identify the challenges and strategic issues of innovative financing of infrastructure projects in general. Further studies may be undertaken using case studies on some of the areas identified in chapter four such as the GETFund and the Road Fund.
- With knowledge in the conceptual underpinnings of innovative financing of infrastructure in general, and after identifying the challenges and strategic issues involved, further research should aim at the identification of the innovative financing of infrastructure options available to Ghana.
- Research may also be undertaken to assess how the use of innovative financing mechanisms for infrastructure projects delivery impact on achievement of project objectives.
- This research into the challenges and strategic issues of innovative financing has clearly demonstrated the need for a sound grasp of innovative finance in relation to infrastructure funding for successful application of innovative financing mechanisms; thus the research may be extended to assess the level of knowledge of professionals involved in the financing/provision of infrastructure and prescribe areas for further education.

REFERENCES

- Abadie R. (2008) “Infrastructure finance –surviving the credit crunch”, *PwC Public Sector Research Centre publication*, www.pwc.co.uk
- Abadie R. X, von Klaudy S. and Kumar G. (2006) “Financing infrastructure in Africa How the Region Can Attract More Project Finance”, *Gridlines publication*, www.ppiaf.org
- African Economic Outlook 2005-2006. Ghana www.oecd.org/dev/publications/africanoutlook
- Ahadzie, D.K. (2007), “A model for predicting the performance of project managers In mass house building projects in Ghana”, PhD thesis, University of Wolverhampton, UK: 2007.
- Andreski Adam, 2008. “Case Study Of Road Funds In Ghana, Malawi & Tanzania” Senior Road Executives Course 2008, University of Birmingham
- Andris Clio, (2008). “School Infrastructure Funding Alternatives”. National Association of Home Builders, Land Development Services. Washington, DC.
(<http://www.nbnews.com/NBN/issues/2005-10-3/Politics+&+Government>)
- Atkinson A. B., (2003). “New Sources for Development Finance: Innovative Sources for Development Finance; Over-Arching Issues; The Way Forward” WIDERhelsinki, August 2003
- Baiden, B.K (2006), “Framework for the Integration of the Project Delivery Team”, Unpublished Thesis (PhD) Loughborough University, United Kingdom.
- Bossé Michael J., 2006. “The NCTM Standards from an Axiological Perspective” National Council of Teachers of Mathematics. <http://www.nctm.org/about/standards.htm>

Cardone Rachel and Fonseca Catarina, 2006. “Innovative Financing: Experiences with Secondary Urban Centres Water Supply and Sanitation Service Delivery” UN-HABITAT report on the water and sanitation in secondary urban centres: paper 1. United Nations Human Settlements Programme (UN-HABITAT). www.unhabitat.org

Caspary Georg, 2009. “Improving sustainability in the financing of large infrastructure projects: What Role For Leaders?” Research Paper, Journal, Corporate Governance Vol. 9 No. 1 2009, pp. 58-72, Q Emerald Group Publishing Limited

Chang C. V. (1999) “Commercial Infrastructure in Africa: Potentials and Challenges”, *Economic Research Papers No 45, African Development Bank*.

Cheung Esther and Chan Albert P.C., 2008. “Is BOT the best financing model to procure infrastructure projects?: A case study of the Hong Kong-Zhuhai-Macau Bridge” Journal of Property Investment & Finance Vol. 27 No. 3, 2009 pp. 290-302. Emerald Group Publishing Limited 1463-578X. www.emeraldinsight.com/1463-578X.htm

Chism Nick, 2009. “Bridging the Global Infrastructure Gap: Views from the Executive Suite” Global research commissioned by KPMG International and conducted in cooperation with the Economist Intelligence Unit. KPMG international, Printed in the U.S.A. 42571NYO

Chism Nick, Beatty Stephen, and Vella Julian, (2010). “The Changing Face of Infrastructure: Frontline views from the public sector”, Global research commissioned by KPMG International from the Economist Intelligence Unit. Publication number: RRD-178520

Christou Evangelos, Valachis Ioannis, and Anastasiadou Constantia, 2008. “Research Methodology in Hospitality Industry: The role of the Inquiry Paradigms”. Available on <http://www.ul.edu.lb/fthm/papers/3rd%20Axis/Methodology%20greece.doc>

Cleveland, A.B. (2008) “Sustaining Infrastructure”, A Bentley White Paper. Bentley’s Applied Research Group, May 2008. www.naturalstep.org/com/what%5Fsustainability

Cohen, James K. 2002. “Innovative Uses of Credit for Financing Infrastructure: Historical and Contemporary Perspectives”. A Report Prepared for The City University Institute for Urban Systems, the City College of New York. New York, New York.

(<http://www.ccny.cuny.edu/cius/documents/InnovativeFinance-Report.pdf>)

<http://www.cunyurbansystems.org/media/InnovativeFinance-Report.pdf>

Cohen Yuval, 2010. “Public-Private Partnerships (PPPs), Innovative Financing, Alternative Project Delivery” A power point presentation for Transportation Workshop at Wyndham Garden Hotel, March 4 2010, Overland Park, KS.

http://www.5countystudy.org/pdfs/innovative_financing_presentation030410.pdf

Creswell, J.W., (1994), “*Research Design: Qualitative, Quantitative and Mixed Methods Approaches*”, 2nd Edition, Sage publications

Crockatt Michael A. and Prentice Barry E., 1999. “Infrastructure Banks: Innovative Financing for Tapped-Out Transport Budgets”. www.fhwa.dot.gov/tea21/factsheets/

Curtis Lisa, 2004. “Infrastructure Financing Current Initiatives, New Opportunities” DFID POVNET Infrastructure Financing Pres, Final

D’Amour D. (1992) “Three Studies on Municipal Infrastructure: Alternative Financing Methods, Demand Management and Public-Private Partnerships”, *Socio-Economic Series, Issue 53, The Canadian Housing Information Centre*.

DeCoster J., 1998. “Overview of Factor Analysis”. Available on www.stat-help.com/notes.html.

DeCoster, J. (2004). “Data Analysis in SPSS”. Available on <http://www.stat-help.com/notes.html>

Development Office, University of Ghana, 2010). Primary data.

Dirie I. (2005) “Municipal Finance: Innovative Resourcing for Municipal Infrastructure and Service Provision”, Report for the Commonwealth Local Government Forum in cooperation with ComHabitat. http://www.clgf.org.uk/userfiles/CLGF/File/Municipal_Finance_Paper.pdf

Dixon T., Pottinger G. and Jordan A. (2005) “Lessons from the private finance initiative in the UK Benefits, problems and critical success factors”, *Journal of Property Investment & Finance*, Vol. 23 No. 5, 2005 pp. 412-423

Dogbegah Rockson, 2009. “Project Management Competency Requirement in the Ghanaian Construction Industry”. Msc. Dissertation, KNUST: 2009.

Estache A. (2004) “Emerging Infrastructure Policy Issues in Developing Countries: A Survey of The Recent Economic Literature”, World Bank Policy Research Working Paper No. 3442

Farlam Peter, 2005. “Working Together: Assessing Public–Private Partnerships in Africa”. Nepad Policy Focus Report No. 2, ISBN: 1-919969-17-9. The South African Institute of International Affairs.

Federal Highway Administration (FHWA) of the US Department of Transportation (USDOT). 2004. “Innovative Finance Primer”. FHWA Publication No. FHWA-AD-02-004. Washington, DC. (<http://www.fhwa.dot.gov/////innovativefinance/ifp/ifprimer.pdf>)

Field, A. (2005), “*Factor Analysis Using SPSS: Theory and Application*”, Available from: <http://www.sussex.ac.uk/users/andyf/factor.pdf>, accessed on 25th March, 2010

Field, A. P., 2005. “*Discovering Statistics Using SPSS (2nd Edition)*”. Sage, London.

Foster V. (2008) “Africa Infrastructure Country Diagnostic: Overhauling the Engine of Growth”: Infrastructure in Africa, The World Bank, www.worldbank.org

Foster Vivien and Briceño-Garmendia Cecilia, 2010. “Africa’s Infrastructure: A Time for Transformation”. A copublication of the Agence Française de Développement and the World Bank. The International Bank for Reconstruction and Development / The World Bank 1818 H Street, NW Washington, DC 20433. www.worldbank.org

Foster Vivien, William Butterfield, Chuan Chen, and Nataliya Pushak. 2009. “Building Bridges: China’s Growing Role as Infrastructure Financier for Sub-Saharan Africa”. Trends and Policy Options series. Washington, DC: PPIAF

Garson David G., 2006. “Chi-square Significance Tests”. Available on www.faculty.chass.ncsu.edu/garson/PA765/chisq.htm

Garson David G., 2006. “Factor Analysis”. Available on www.faculty.chass.ncsu.edu/garson/PA765/factor.htm

Ghana Investments Promotion Centre, 2007, “Infrastructure”, www.gipc.org.gh

Govindan Nair and Yescombe E.R., 2008. “Financing Ghana’s Infrastructure Needs: A Public-Private Partnership/Private Finance Approach”. A power point presentation for the National PPP/PFI Workshop, November 2008.

Grahame Allen, 2001. “The Private Finance Initiative (PFI)”. Library Research Papers, Research Paper 01/117. ISSN 1368-8456. <http://www.parliament.uk/commons/lib/research/rp2001/rp01-117.pdf>.

Greg Elvers, 2004. “Using SPSS for Norminal Data: Binomial and Chi-square Tests”. Available on www.academic.udayton.edu/GregElvers/pey216/SPSS/

Guerrero P. F. (2001) “U.S. Infrastructure: Funding Trends and Federal Agencies” Investment Estimates, Working Paper GAO-01-986T, General Accounting Office, U S A.

Guillory Kristi, 2007. “Financing Transportation Infrastructure” Trends in America Issue Briefs, The Council of State Governments, November 2007 www.trendsinamerica.org

Hernández Francisco M. 2008. “Analysis of the Espoo Convention as applied to mega projects: The case of Nord Stream”. MSC. Thesis Lund University Center for Sustainability Studies, May 2008

Klein, H. K. and Michael D. Myers. “A Set of Principles for Conducting and Evaluating Interpretative Field Studies in Information Systems”. MIS Quarterly, Special Issue on Intensive Research 1999, pp. 67-93. <http://www.qual.auckland.ac.nz/MDMyers/klein-myers.pdf>

Koetting, R., J. (1996). “Philosophy, research, and education”. In D. Jonassen, H. (Ed.), Handbook of research for educational communications and technology (pp. 1137-1147). New York: Macmillan.

Kumar Geeta, Sheppard Robert, and von Klaudy Stephan, (2006). “Financing infrastructure in Africa: How the region can attract more project finance?” Gridlines, Note NO. 13 – Sept. 2006. <http://www.ppiaf.org>

Malcolm Jack & Braimah Farouk R., 2004. “Feasibility study for the application of Community-Led Infrastructure Finance Facility (CLIFF) operations in Ghana”. United Nations Human Settlements Programme.

McCrosson A. and Cleal P. (2008) “Infrastructure”, Prequin 2008 Infrastructure Review www.pwc.com/uk

Mensah Sam, 2008. “An Overview of Public-Private Partnerships” A power point presentation by Ministry of Finance and Economic Planning for MOFEP PPP Workshop, November 20-22, 2008.

Mor Nachiket and Sehrawat Sanjeev (2006), “Sources of Infrastructure Finance”. Working Paper Series, Institute for Financial Management and Research, Centre for Development Finance
[www. icicibank.com](http://www.icicibank.com)

Moszoro Marian and Krzyzanowska Magdalena, 2009. “Striving for the Quality of Public Services Through Public-Private Partnerships: The Case of 7 Projects in The City of Warsaw”. Available on <http://ssrn.com/abstract=1146965>, www.wsb-nlu.edu.pl, www.wspiz.edu.pl

Moteff John, Copeland Claudia, and Fischer John, 2003. “Critical Infrastructures: What Makes an Infrastructure Critical?” Report for Congress, Congressional Research Service, The Library of Congress <http://www.crs.gov/>

National Conference of State Legislatures, (2007). “A Summary of State Legislation to Encourage Innovative Infrastructure Finance Options” Final Report. National Association of Home Builders 1201 15th Street, NW Washington, DC 20005

National Surface Transportation Infrastructure Financing Commission, 2008. “The Path Forward: Funding and Financing Our Surface Transportation System” Interim Report of the National Surface Transportation Infrastructure Financing Commission, February 2008
<http://financecommission.dot.gov/>

Ngowi A. B., Pienaar E., Akindele O., and S.Iwisi D. (2006) “Globalisation of the Construction Industry: A Review of Infrastructure Financing”, *Journal of Financial Management of Property and Finance*, 2006, Vol 11, Issue 1, Pg 45-58.

Nichol C., 2007. “Innovative Finance and Alternative Sources of Revenue for Airports”. Airport Cooperative Research Programme, Synthesis1. Available on www.national-academics.org/trb/bookstore

Nicolosi P. (2009) “Innovative Methods of Local Government Infrastructure Financing: A Guide to Comprehensive Financial Planning for Local Governments”, *ICM Public Management Magazine, December · Volume 90 · Number 11*

Orlikowski & Baroudini, 1991. “Studying Information Technology in Organizations: Research Approaches and Assumptions” Presentation for INF9200 by Lasse Berntzen

Owusu M. D. and Badu E., 2009. “Determinants of contractors’ capital investment finance strategy in Ghana”. *Journal of Financial Management of Property and Construction*, Vol. 14 No. 1, 2009. Emerald Group Publishing Limited, 0007-070X

Oyewole Bayo, 2009. “Public Private Partnerships in Education: PPPs for Social Services and Infrastructure” A power point presentation by International Finance Corporation for MOFEP PPP Seminar, September, 2009. Accra, Ghana.

Platz D. (2009) “Infrastructure Finance in Developing Countries—The Potential Of Sub-Sovereign Bonds”, DESA Working Paper No. 76ST/ESA/2009/DWP/76. United Nations, Department of Economic and Social Affairs, New York, N.Y. 10017, USA. <http://www.un.org/esa/desa/papers>

Ploeg Vander, and Casey G., 2006. *New Tools for New Times: A Sourcebook for the Financing, Funding, and Delivery of Urban Infrastructure (Parts I and II)*. Canada West Foundation. Calgary, Alberta. Canada West Foundation, ISBN 1-894825-88-8, www.cwf.ca

Ploeg Vander, and Casey G., 2008. “Delivering the Goods: Infrastructure and Alternative Revenue Sources for the City of Edmonton” Canada West Foundation. Calgary, Alberta. www.cwf.ca.

Porter Andrew, 2008. “Future for PPPs in Ghana” A power point presentation by Price Waterhouse Coopers for Ghana PPP Workshop, November 2008.

Rummel R. J., 2004. “Understanding Factor Analysis”. Available on www.hawaii.edu/powerkills/UFA.HTM

Sagar Ajay, 2009. “Infrastructure and Project Financing: Asia Pacific Scenario” Asian Development Bank. www.adb.org.

Scobie Tanya, 2009. “ Private Finance Initiatives: How to ensure delivery of high-quality public services-without the mandate to do so”. IFC SMARTLESSONS — APRIL 2009

Semler Michael, (2005). “Financing California’s Infrastructure”. Government Department, Sacramento State University. Sponsored by the CSU Faculty Research Fellows Program, December 2005

Sheffrin S. M. (2003), “*Economics Principles in Action*”, New Jersey 07458: Pearson Prentice Hall, ISBN 0-13-063085-3, pp. 474.

Sheppard N. (2009) “Challenges Facing Infrastructure Development In Africa Can Be Overcome”, Press Release, Infrastructure Consortium for Africa, African Development Bank. www.icafrica.org

Sheppard Robert, 2006. “Financing of Private Infrastructure in Sub-Saharan Africa.” Draft report prepared for World Bank, Infrastructure Economics and Finance Department; and PPIAF, Washington, D.C.

Sihombing Lukas B., 2007. “Financial Innovation For Infrastructure Financing”. For The 1st International Conference of European Asian Civil Engineering Forum, EACEF 26-27 September 2007. <http://ssrn.com/abstract=1418823>

Sihombing Lukas B., 2007. The Improvement Of Nation Investment Competitiveness: Financial Innovation For Infrastructure Financing” <http://ssrn.com/abstract=1418823>

Sihombing L. B. (2009) “Financial Innovation for Infrastructure Financing”, <http://ssrn.com/abstract=1418823>

Slone Sean, (2009). “Transportation & Infrastructure Finance”. A CSG national report, The Council of State Governments, Lexington, Ky. www.csg.org

Stein Alfredo and Castillo Luis, (2005). “Innovative financing for low-income housing improvement: lessons from programmes in Central America” Environment and Urbanization 2005;17;47.DOI:10.1177/095624780501700117
<http://eau.sagepub.com/cgi/content/abstract/17/1/47>

Stuart S. (2008) “Debt and Development: Ghana - A case study”, A Worldwrite paper, www.worldwrite.org.uk

Suresh, V. 2004. “Innovative Infrastructure Financing”. A power point presentation by the Director General of Good Governance and the Former Chairman and Managing Director of HUDCO. New Delhi, India.
(<http://iif.edu/data/iif/innews/V%20Suresh%205%20March%202004.ppt>)

Thay Bishop, 2008; “Accelerating Infrastructure Through Innovative Finance Tools” Innovative Finance Technical Service Team, Federal Highway Administration-National Resource Center.
http://www.fta.dot.gov/documents/Day_1_-_IId_-_Innovative_Financing_-_TBishop.pdf

The Residential and Civil Construction Alliance of Ontario (RCCAO), 2006. “The Infrastructure Funding Deficit: Time to Act”. D18-06007 Available on www.rccao.com

The World Bank 2002, “Upgrading Low Income Urban Settlements Country Assessment Report, Ghana”, www.worldbank.org

Thunell L. H. (2009) “Their/Our Story: Creating Opportunity Where It’s Needed Most” Highlights From Ifc 2009 Annual Report

Townsend Paul, 2005. “Uk Healthcare –Private Financing of Infrastructure”. Available on <http://www.euromedsalut.net/Du18/html/ca/dir1389/dd4089/a3townsend.pdf>.

Trujillo José A, Cohen Remy, Freixas Xavier, and Sheehy Robert, 1997. “Infrastructure Financing With Unbundled Mechanisms”. Inter-American Development Bank. Washington, DC. (<http://www.iadb.org/sds/doc/1208eng.pdf>)

UCLA Academic Technology Services, 2010. “Statistical Tests in SPSS: Choosing the Correct Statistical Test”. Available on www.ats.edu/stat/spss/whatstat/

UNECF (2008), “United Nations Economic Commission for Europe -guidebook on promoting good governance in public-private partnerships”, United Nations New York and Geneva, 2008, Available online via <http://www.unece.org/ceci/publications/ppp.pdf> (Retrieved in 13th October, 2009)

U.S. International Trade Commission, (2009). “Sub-Saharan Africa: Effects of Infrastructure Conditions on Export Competitiveness”, Third Annual Report, Investigation No. 332-477. USITC Publication: 4071, Washington, DC 20436 www.usitc.gov

Venkatachalan Pritha, 2005. “Innovative Approaches to Municipal Infrastructure Financing”. Working Paper Series, ISBN #1-894825-88-8. Available on www.lse.ac.uk/depts/destn

Wachs Martin, (2006). “Critical Issues for Transportation Policy and Finance”, The Second William O. Lipinski Symposium on Transportation Policy, The RAND Corporation 2006.

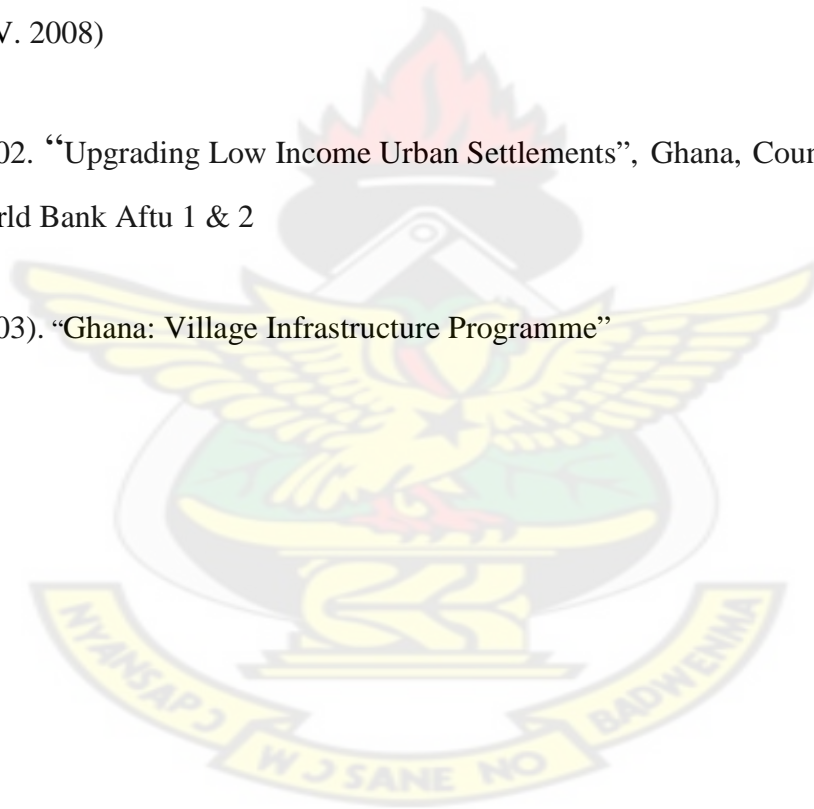
Wielkiewicz Richard M., 2000. “Chi-square with SPSS”. The McGraw-Hill Companies.
Available on www.nhhe.com/socscience/psychology/runyon/spss/chisquare.html

Woochong U. (2009) “Investing In Sustainable Infrastructure” Publication Stock No. ARM090554, Asian Development Bank.

World Bank, 2008. Overhauling the Engine of Growth: Infrastructure in Africa”. A World Bank Report. (Foster V. 2008)

World Bank, 2002. “Upgrading Low Income Urban Settlements”, Ghana, Country Assessment Report, The World Bank Aftu 1 & 2

World Bank, 2003). “Ghana: Village Infrastructure Programme”



APPENDIX A

EXPLORATORY INTERVIEWS ON INNOVATIVE FINANCING

The purpose of these interviews is to identify the challenges and the strategic issues in innovative financing of infrastructure projects which shall then be tested in a general survey.

Lead Questions:

Innovative financing of infrastructure is a broadly defined term that includes a number of tools that supplement traditional sources and methods of financing to overcome cash flow shortages and attract new sources of capital (US Federal Highway Administration, 2004; Ploeg, 2006).

1. What would you say are the challenges of innovative financing of infrastructure projects delivery in Ghana?
2. What are the strategic issues in devising these innovative mechanisms to finance infrastructure projects in Ghana?
3. How do the strategic issues relate to the outcomes of infrastructure project delivery?
4. Is there any other issue you would like to draw our attention to, taking into consideration the research topic?

Thank you for your time and effort.

APPENDIX B

SURVEY QUESTIONNAIRES

1) Please state your institutional affiliation and the capacity in which you work.

A. Institution.....

B. Capacity.....

2) Please indicate how long you have been involved in the provision/financing of infrastructure projects in Ghana.

A. Up to 5 years ☐

B. 6-10 years ☐

C. 11- 15 years ☐

D. 16-20 years ☐

E. Over 20 years ☐

3) How would you rate the *extent* of the following challenges of innovative financing of infrastructure projects in Ghana? Please *thick* the appropriate number.

Key: 1=Not critical 2=Less critical 3=Averagely critical
4=Critical 5=Very critical

A. Adequacy of revenue	1	2	3	4	5
B. Cost efficiency (delays/cost overruns)	1	2	3	4	5
C. Issues of how funds are spent	1	2	3	4	5
D. Sustainability of the strategy in the long run	1	2	3	4	5
E. Fiscal prudence	1	2	3	4	5
F. Excessive reliance on traditional sources	1	2	3	4	5
G. Expectations of the populace	1	2	3	4	5
H. Lack of long-term financing at fixed interests	1	2	3	4	5
I. Exploring alternative methods	1	2	3	4	5
J. Maintaining and replacing infrastructure assets	1	2	3	4	5
K. Improving revenue collection	1	2	3	4	5
L. Enforcement of laws	1	2	3	4	5
M. Corruption	1	2	3	4	5
N. Governance and institutional capacity issues	1	2	3	4	5

4) How would you rate the **importance** of the following strategic issues in innovative financing of infrastructure projects in Ghana? *Please **thick** the appropriate number.*

Key: 1=Not important 2=Less important 3=Averagely important 4=Important

5=Very important

A. Revenue potential	1	2	3	4	5
B. Diversification	1	2	3	4	5
C. Issues of how funds are spent	1	2	3	4	5
D. Sustainability of the strategy in the long run	1	2	3	4	5
E. Strategies for allocation of funding	1	2	3	4	5
F. The principles of cost recovery from users	1	2	3	4	5
G. Demand management	1	2	3	4	5
H. The capacity to overcome cash flow shortages	1	2	3	4	5
I. Viability of these sources of financing	1	2	3	4	5
J. Appropriateness to project type	1	2	3	4	5
K. Legal and regulatory implications	1	2	3	4	5
L. Governance and institutional capacity issues	1	2	3	4	5
M. Ease of Compliance	1	2	3	4	5