

Masters Program in **Geospatial Technologies**



PUBLIC PRIVATE COLLABORATION: POTENTIALS FOR SPATIAL DATA INFRASTRUCTURE DEVELOPMENT IN DEVELOPING COUNTRIES

A Case study of Nigeria

Chima Ogbonnaya Nkwor

Dissertation submitted in partial fulfillment of the requirements for the Degree of Master of Science in Geospatial Technologies

PUBLIC PRIVATE COLLABORATION:
*POTENTIALS FOR SPATIAL DATA INFRASTRUCTURE DEVELOPMENT IN
DEVELOPING COUNTRIES*

A Case study of Nigeria

Dissertation supervised by

Professor Albert Remke, Ph.D

Dissertation co-supervised by

Professor Marco Painho, Ph.D

Professor Joaquin Huerta, Ph.D

March, 2011

AUTHOR'S DECLARATION

I hereby declare that this thesis is my original work and that I have not received any external assistance and only the sources cited were used. This thesis has never been submitted for any other degree program, and is submitted exclusively to the Universities participating in the Erasmus Mundus Master program in Geospatial Technologies.

Munster, 25th February, 2011

.....
Chima, Ogbonnaya Nkwor.

.....
Place and Date.

ACKNOWLEDGEMENTS

Obtaining this Master Degree in Geospatial Technologies at this time would not have been possible without the financial support to me by the Westfalische Willhelms-University through the Institute for Geoinformatics (IFGI), Germany. In this regards, I wish to express my sincere appreciation to you all for touching and changing my life through this scholarship.

Furthermore my special appreciation also goes to the entire staff and my professors at Institute for Geoinformatics (IFGI), University of Muenster, Germany, Instituto Superior de Estatistica e Gestao de Informacao, Universidade Nova de Lisboa (ISEGI), Portugal and Universitat Jaume I, Spain for their great support to me throughout this study. I must equally use this chance to express my million thanks to Professor Dr. Albert Remke, Professor Dr. Marco Painho and Professor Dr. Joaquin Huerta for their articulated comments and out of their tight schedules gave useful advice that made this research a success.

This acknowledgment cannot come to an end without my appreciation to my darling wife Ogonna for her inspiring words and encouragement throughout this study. Darling you deserve my sincere thanks for always being there for me despite difficult moments. In the same vein my appreciation also goes to my mother, brothers and sisters: Madam Oshiahu Rubbecca Chima, Onyiba Agwu Chima, Mr. God'swill Chima, Dan, Abel and Miss Nnenna chima for all their patience and prayers for me throughout this 18months long journey. May God bless you all and your families for such sacrifice for me!

PUBLIC PRIVATE COLLABORATION:
POTENTIALS FOR SPATIAL DATA INFRASTRUCTURE
DEVELOPMENT IN DEVELOPING COUNTRIES

A Case study of Nigeria

ABSTRACT

Many countries across the world embark on the building of SDI to facilitate the sustainable development of their country. However the challenge of developing such infrastructure to a large extent depends on its implementation, which is significant that no single sector can address alone without collaboration and partnership. Public Private Partnership (PPP) is among the strategies currently advocated for SDI development by various SDI experts. This research therefore analyzes SDI development with reference to the institutional arrangements, policy and technology components of SDI and PPP case experiences of Australia, Canada, United States and the Netherlands from developed countries and on the other hand, Egypt and South Africa from the developing countries.

A questionnaire survey and literature review was carried out on relevant GI organizations to ascertain the status of the NGDI development and the potentials of PPP in the geospatial sector in Nigeria. The analysis reveals that PPP has a high level of acceptance among respondents as an approach in the future for the development of SDI in Nigeria. However, absence of SDI policy directive, coordination of donor funded projects in the sector are identified as major hurdles that has to be overcome for the success of SDI development through PPP in Nigeria. Moreover, comparative analysis of the selected cases shows some unique similarities and differences between developed and developing countries. Thus, it is acknowledged that public and private sectors, by nature are complementary and hence effective PPP can only be created through “mutually designed, analyzed and accepted instruments of cooperation and collaboration”.

In conclusion, for SDI development to be achieved successfully through PPP approach deliberate and sincere effort need to be made by the government to create enabling environment for the private sector participations in the sector. This, therefore, involves among others the passing of the long awaited GI policy in the country, creating better environment for dialogue between the government and the private sectors, promotion of talk shows and workshops for public awareness in new SDI concepts.

KEY WORDS

Geospatial Information (GI)

Institutional Arrangement

National Geospatial Data Infrastructure (NGDI)

Policies and Legislation

Public Sector

Private Sector

Public Private Partnerships (PPP)

Spatial Data Infrastructure (SDI)

Technology

ACRONYMS

| | |
|--------|---|
| ANZLIC | Australian and New Zealand Land Information Council |
| ASDI | Australian Spatial Data Infrastructures |
| CGDI | Canadian Geospatial Data Infrastructure |
| ESA | Egyptian Survey Authority |
| ESRI | Environment System Research Institute |
| GI | Geo Information |
| GIS | Geographic Information Systems |
| FGDC | Federal Geographic Data Committee |
| FOIA | Freedom of Information Act |
| GBKN | Large Scale Base Maps of the Netherlands |
| NMA | National Mapping Agency |
| NASRDA | National Space Research and Development Agency |
| NSDI | National Spatial Data Infrastructure |
| NGDI | National Geospatial Data Infrastructure |
| NGII | National Geographic Information Infrastructure |
| PPP | Public Private Partnerships |
| RAVI | Dutch Council for Real Estate Information |
| SDI | Spatial Data Infrastructure |
| SWOT | Strength Weaknesses Opportunities and Threats |

TABLE OF CONTENTS

| | |
|---|----------|
| ACKNOWLEDGEMENT..... | iv |
| ABSTRACT..... | v |
| KEY WORDS..... | vi |
| ACRONYMS..... | vii |
| INDEX OF TABLES..... | xi |
| INDEX OF FIGURES..... | xii |
| 1. INTRODUCTION..... | 1 |
| 1.1 Background..... | 2 |
| 1.1.1 Development of Private Sectors in Nigeria..... | 2 |
| 1.1.2 PPP Approach to Service Delivery in Nigeria..... | 2 |
| 1.1.3 Geospatial Services and Providers in Nigeria..... | 3 |
| 1.2 Research Problem..... | 3 |
| 1.1.1 Problem Statement..... | 5 |
| 1.3 Research Objective..... | 5 |
| 1.4 Research Questions..... | 5 |
| 1.5 Research Methodology..... | 5 |
| 1.6 Research Organization..... | 6 |
| 2. PPP AND NSDI DEVELOPMENT EXPERIENCES..... | 8 |
| 2.1 Introduction..... | 8 |
| 2.2 Definition of PPP..... | 8 |
| 2.3 Models of PPP Arrangements..... | 9 |
| 2.4 Definition of SDI..... | 12 |
| 2.5 Components of SDI..... | 12 |
| 2.5.1 Data..... | 13 |
| 2.5.2 People and Partnership..... | 14 |
| 2.5.3 Institutional Framework and Policies..... | 14 |
| 2.5.4 Technology Component..... | 16 |
| 2.5.5 Standard..... | 16 |
| 2.6 Review of NSDI Initiatives Fostering PPP Approach in Developed Countries..... | 17 |
| 2.6.1 Australian Spatial Data Infrastructure..... | 17 |
| 2.6.2 Canadian Geospatial Data Infrastructure..... | 20 |
| 2.6.3 National Geographic Information Infrastructure (The Netherlands)..... | 23 |

| | |
|---|-----------|
| 2.6.4 National Spatial Data Infrastructure (USA)..... | 26 |
| 2.6.5 PPP Lessons Learnt from Developed Countries NSDI Initiatives..... | 29 |
| 2.7 Review of NSDI Initiatives Fostering PPP Approach in Developing Countries..... | 32 |
| 2.7.1 National Spatial Information Framework (South Africa)..... | 32 |
| 2.7.2 National Geospatial Data Infrastructure (Egypt)..... | 34 |
| 2.7.3 PPP Lessons Learnt from Developing Countries NSDI Initiatives..... | 36 |
| 2.8 Comparative Analysis of the development of SDIs in Developed and Developing Countries..... | 38 |
| 2.9 Summary & Conclusions..... | 40 |
| 3. DEVELOPMENT OF SDI IN NIGERIA..... | 41 |
| 3.1 Introduction..... | 41 |
| 3.2 Nigeria in Brief..... | 41 |
| 3.2.1 Geographic Facts..... | 41 |
| 3.2.2 Economic Situation..... | 42 |
| 3.3 NGDI and GeoInformation Policy..... | 43 |
| 3.3.1 Institutional Arrangement..... | 44 |
| 3.3.2 Policy and Legislation..... | 46 |
| 3.3.3 Technology..... | 47 |
| 3.4 SDI Initiatives in Nigeria..... | 48 |
| 3.5 SDI Activities and Private Sector Involvements in Nigeria..... | 48 |
| 3.6 Situational Analysis of Nigeria's Geospatial Sector..... | 50 |
| 3.7 Summary and Conclusion..... | 52 |
| 4. METHODOLOGY ADOPTED FOR DATA COLLECTION, ANALYSIS AND EVALUATION OF REVIEWED CASES..... | 54 |
| 4.1 Introduction..... | 54 |
| 4.2 Data Collection Strategy..... | 54 |
| 4.2.1 Primary Data..... | 54 |
| 4.2.2 Secondary Data..... | 56 |
| 4.3 Results of Data Analysis..... | 56 |
| 4.3.1 Descriptive Statistics & Summaries..... | 56 |
| 4.4 PPP Parameters for SDI Development in Nigeria..... | 61 |
| 5. PROPOSED PPP GUIDELINES/STRATEGIES FOR SDI DEVELOPMENT FOR NIGERIA..... | 65 |
| 5.1 Introduction..... | 65 |

| | |
|--|-----------|
| 5.2 Conclusions..... | 67 |
| 6. CONCLUSIONS AND RECOMMENDATIONS..... | 68 |
| 6.1 Introduction..... | 68 |
| 6.2 Conclusions..... | 68 |
| 6.3 Limitation of the Study..... | 71 |
| 6.4 Recommendations..... | 71 |
| 6.4.1 Strategic and operational Recommendations..... | 72 |
| 6.4.2 Recommendarions for future Research..... | 72 |
| BIBLIOGRAPHIC REFRENCES..... | 74 |
| APPENDICES..... | 83 |
| 1 Questionnaire..... | 83 |

INDEX OF TABLES

| | |
|---|----|
| Table 1: PPP Arrangement Models - Canada Examples based on CCPP, 2004..... | 11 |
| Table 2: Comparison of SDI development in Developed and Developing countries..... | 38 |
| Table 3: SWOT Analysis of Nigeria's Geospatial Sector..... | 51 |
| Table 3: Questionnaire Survey Respondent & Organizations Interviewed..... | 56 |
| Table 4: Survey Sample Size & Rate of Response..... | 57 |

INDEX OF FIGURES

| | |
|---|----|
| Figure 1: Research Organization | 7 |
| Figure 2: SDI Framework & Core Components (Warnest, 2005)..... | 13 |
| Figure 3: Dynamic Interaction and Interrelationships between SDI Components | 15 |
| Figure 4: PPP Organizational Model for GBKN in the Netherlands..... | 24 |
| Figure 5: Locational Map og Nigeria..... | 42 |
| Figure 6: NGDI Organizational Framework in Nigeria..... | 44 |
| Figure 7: Bridging the identified gap with strategies from SWOT..... | 51 |
| Figure 8: Questionnaire Analysis by Sector..... | 57 |
| Figure 9: Questionnaire Analysis by Rank Profiles..... | 58 |
| Figure 10: Experience of organizations in the use of PPP..... | 59 |
| Figure 11: Expected roles of private sectors in SDI development in Nigeria..... | 59 |
| Figure12: Existence of Geospatial Pricing Policy..... | 60 |

1. Introduction

Every country is at one stage or another in the continuum of National Data Infrastructure (NSDI) development (Williamson, 2003). Thus the road to this development in many countries has never been an easy task. Countries experience one form of “ups and downs” in the institutionalization and development processes of NSDI (Agbaje, 2008). As noted by Agbaje (2008), the process of National Geospatial Data Infrastructure (NGDI) institutionalization and development can be said to be a “process of learning where errors are committed to be corrected”

Presently, many developing countries are at this learning phase in their SDI development as well as facing several challenges in the course. Many of these countries are adopting various strategies, trying different implementation plans in order to tackle prevailing problems in their SDI development, which by nature goes beyond the capacity of one sector. In this regards several national SDI (NSDI) coordinating agencies across the world today are encouraging “public private partnership” as a veritable approach to SDI development (FGDC, 1997, ANZLIC, 1999).

The concept of public private partnership (PPP) therefore connotes a “*collaborative relationships between the public and private sector agencies, in which both parties under a formal contract agreement accepts to work together to achieve a common purpose or undertake a specific task and to share risks, responsibilities, resources, competencies and benefits*” (UN 2003b, ADBI 2000, p. 42).

Although the degree to which the private sectors are integrated into national activities for SDI development differs across countries, however the undertaking of PPP by governments for SDI development can results to an improved quality of services and added value in capital invested (Adadie and Howcroft , 2004).

In the development of SDI in many countries, the private sectors have a role which they are able to play in this process (Fornefeld et al., 2003). This research will concentrate on identifying the role of the private sector as it relates to Cadastre and National Mapping Agencies (NMA) and as an important element of SDI. Land administration is a key driver in the evolution of SDI. In modern societies, SDI plays a broader role than supporting in only land administration (Williamson et al., 2001). Hence, SDI development in developed societies (Australia, Canada, Netherlands, and United States of America) and developing countries (Egypt and South Africa) will be analyzed. In addition to the analysis of SDI developments in the above countries, the PPP experience of Nigeria in water sector will also be investigated.

These are carried out to identify parameters required for proposing strategies for PP collaboration in the field of SDI development in developing countries, with Nigeria as case study region.

1.1 Background

1.1.1 Development of Private Sector in Nigeria

In the past few years, Nigeria has witnessed the development of private sectors which today are playing various roles and making contributions to its economic development as a country. Various international agencies and donors are helping to support private organizations and their collaborations with other government agencies for infrastructural developments in the country. For example, the World Bank through its International Development Association (IDA) granted the country a credit facility loan of US\$300 million in 2004 to assist in private sector development, tackling pressing issues in business environments and the passage of necessary legislations to support private sector institutions in the country (CBN report, 2005)¹. To fast track the development of private sector in the country, a national policy on public private partnership was enacted and the Infrastructure Concession Regulatory Commission (ICRC) also established.

Moreover, the United State Agency for International Development (USAID), the United Kingdom Department for International Development and the United Nation are also helping in the development of private sectors, for instance in land registration and recertification program within the Federal Capital Territory, Abuja (AGIS², 2008). In addition, these agencies are also involved in the support of major sectors like education, water, telecommunication and health, where public private partnership is being used as an approach for the delivery of public services effectively (NESG³, 2009).

1.1.2 PPP Approach to Service Delivery in Nigeria

Major public services such as telecommunication, education, health, water and power are been provided traditionally by the government alone in the past. Presently with the development of the private sector in Nigeria, public service delivery in the above sectors are no longer implemented traditionally by the government alone but are today a joint efforts of the public and private sectors. The above situation therefore has resulted in the establishment of PPP in Nigeria. In the sectors like telecommunication, the collaboration of both the public

¹ CBN – Central Bank of Nigeria Annual performance review Report.

² AGIS Editorial paper publications 2008 on the Myth of the Abuja Master plan

³ Nigerian Economic Summit Group (NESG) – A report paper of Nigerian Economic Summit, 2009.

and private sectors in the delivery of most public services is considered as a way forward “towards a more coherent service delivery system in Nigeria” (BPE, 2009).

1.1.3 Geospatial Services and Providers in Nigeria

In today’s information and communication highways, geographic information (GI) is playing a critical role in the implementation and success of most government functions or tasks (Kok and Loenen, 2004). Geospatial services in Nigeria embraces those services such as creation and maintenance of maps, web mapping activities, data analysis and conversions, development of system for geospatial data infrastructure as well as the associated trainings accompanying them. These services are being carried out in the country by both the private and public geographic organizations. There are presently a vast number of geospatial private organizations involved in the creation, distribution and use of geospatial information in Nigeria.

The public sector is the traditional geospatial information services provider and user. However, the demand for geographic information services are also growing rapidly as evident in the number of GIS tenders being advertised presently by the government.

Due to several economic reforms in the country in the few years, including national policy on public private partnership, there is a suitable environment for the private sector to contribute toward SDI development in geospatial sector, as seen in other sectors (education, water and telecommunication) in the country.

1.2 Research Problem

The collaboration of the public sector with the private counterparts is vital for the growth of the geospatial sector and hence should be given full consideration if a society wants to utilize geographic information to its fullest for geospatial services delivery (GAG, 2004)⁴. Such situation therefore entails an arrangement in which both the public and private GI entities can understand each other and consequently work together as partners for a common goal of effective geospatial services delivery.

In Nigeria, likewise other developing nations, the private GI entities and organizations are confronted with numerous problems in their effort for efficient geospatial services delivery to its customers. The cause of the above problems are attributed to the limited collaborations existing between the public and the private geospatial information organizations in the country. According to Williamson et al (2003), partnerships with entities with innovative

⁴ Geography Advisory Group (GAG, 2004).

ideas often results in greater success in the realization of the best service potentials available in the market.

The public sector is the key sector responsible for the provision of geospatial data as well as its infrastructure development in the country. Currently the rate of progress in SDI development in Nigeria is slow. The participation of the private sector through public private partnership (PPP) should be considered as an approach for its development and strengthening.

Public-Private Partnerships in the country has shown great success as an approach for service delivery in most sectors like water and telecommunication. It has therefore laid “a strong and good foundation in those sectors both in the economic and quality services delivery sides” (AERC, 2002)⁵. The existence of national policy on Public Private Partnership is one of those foundations already laid. In 2005, the national policy on public private partnership was enacted, followed in the same the year with the establishment of Infrastructure Concession Regulatory Commission (ICRC). The national policy on PPP in the country emphasized the collaboration of both the public and private sectors in the development of major infrastructure projects as well as in its delivery to the general public. Within the period that PPP was introduced as an approach to public infrastructure development, network coverage and quality of services in the telecommunication sector, for example, has improved in the country from originally 58 percent in 2005 to 80 percent in 2008 (Moshiro,2008). Water supply, on the other hand, in the urban areas also improved on a positive note from 65 percent to 67 percent (Abuja water Board, 2009).

With the manifestation in benefits of public private partnership in most sectors (telecommunication and water), the development of SDI in the country need to follow the same trend and approach. The development of SDI no doubt needs a new relationship and partnerships between relevant stakeholders (private and public sectors) to be successful (Rajabifard and Williamson, 2000). In most developed countries like Australia and others, partnerships between the public and private sectors have become a common approach adopted for cadastral and land administrations and encouraged in general for SDI developments (ANZLIC, 1999). The establishment of PPP as an approach to SDI development could be beneficial to numerous users and providers of geospatial services across Nigeria.

⁵ African Economic Research Consortium (AERC, 2002): A research paper 129 on Public Enterprise reform in Nigeria with evidence from the telecommunications industry.

1.2.1 Problem Statement

In Nigeria, limited collaboration exist between the public and private GI organizations in the designing, creation and delivery of geospatial information and services. Also in the country's geospatial sector, no real tradition of such collaboration exist. In other countries, experience has shown that private organizations within public private partnership arrangement play a key role and hence can offer relevant contributions to the development of SDI (Masser, 2005, Radwan, 2005). Presently, PPP offers veritable mechanism for speedy development and strengthening of SDI in Nigeria.

1.3 Research Objectives

The main objective of this research is to assess the potentials of public private partnership by recommending strategies for the support of National Geospatial Data Infrastructure development in Nigeria.

To achieve the above objective, private sector involvements in selected NSDI initiatives of countries and in three key SDI components (institutional arrangements, policies and technology) are reviewed.

1.4 Research Questions

The research is to be guided by the following questions:

1. What roles do private sectors play in institutional, policies and technological issues from developed and developing countries that can be considered for PPP approach in SDI development in Nigeria? What lessons are there to be learnt from such experience(s)?
2. What are the opportunities, challenges and threats for private sector involvement in SDI development in Nigeria?
3. What are the essential requirements for the establishment of PPP for SDI development in Nigeria?

1.5 Research Methodology

To achieve the objective of this thesis as well as tackle the research questions stated, a questionnaire survey was conducted about private sectors involvement in SDI development in Nigeria. The survey is used not only as basis for data collections but also for in-depth understanding of the PPP experiences in Nigeria. Furthermore, a comparative analysis of PPP experiences and role of private sectors in selected NSDI across the globe was made focusing

mainly on three SDI components (Institutional arrangements, policy and legislations as well as technology). This is done in order to identify key parameters, opportunities, lessons learnt in public and private sectors collaboration as well as drawing out outstanding best practices from countries cases which are relevant to support PP collaboration in the field of SDI development in Nigeria.

The domain of literatures explored for relevant information includes research articles and papers, book, official and international reports as well as online materials. Besides, important information, comments and suggestions were also collected through telephone interviews, post and emails from relevant experts and officials in government ministries and agencies in Nigeria as input. Finally, recommendations will be proposed on strategies for private sector involvement in SDI development in Nigeria. The steps involved in the methodology are depicted in Figure 1.

1.6 Research Organization

The research is organized into six chapters which are structured as depicted below in figure 1.

Chapter one provides the research overview. It starts with a brief description of the research topic, research background, problem statement, research objectives, questions, methodology of the research and finally the organization.

Chapter two reviews the necessary literature on the topic. A general introduction of PPP is presented with the definitions and modes. Furthermore, a critical review of private sector involvement in National SDI developments of some selected developed countries (Australia, Canada, Netherlands, USA) and developing economies (Egypt and South Africa) are explored under the three SDI components :- institutional arrangement, policy and legislations as well as technology. This is carried out to provide specific lessons learnt and to act as guide towards formulating a strategy for SDI development in Nigeria with focus on private sector involvement.

Chapter three focuses on the overview of SDI initiatives and activities that Nigeria has went through in an effort to develop SDI as well as the PPP experience of the country in the water sector. Furthermore the chapter describes the methodologies that are used for data collection in the field.

Chapter four focuses on the evaluation process where reviewed PPP of developed and developing countries SDI, water service sector in Nigeria and situational analysis of the geospatial sector of Nigeria are analysed. This is carried out in order to identify PPP

parameter and eventually strategies for private sector involvement in SDI development in Nigeria in the next chapter.

Chapter five: Presents the developed PPP strategies/guidelines for SDI development in Nigeria with reference to the three SDI component (institutional arrangement, policies and technology).

Chapter six presents the final conclusions of the research, study limitations and recommendations for future research.

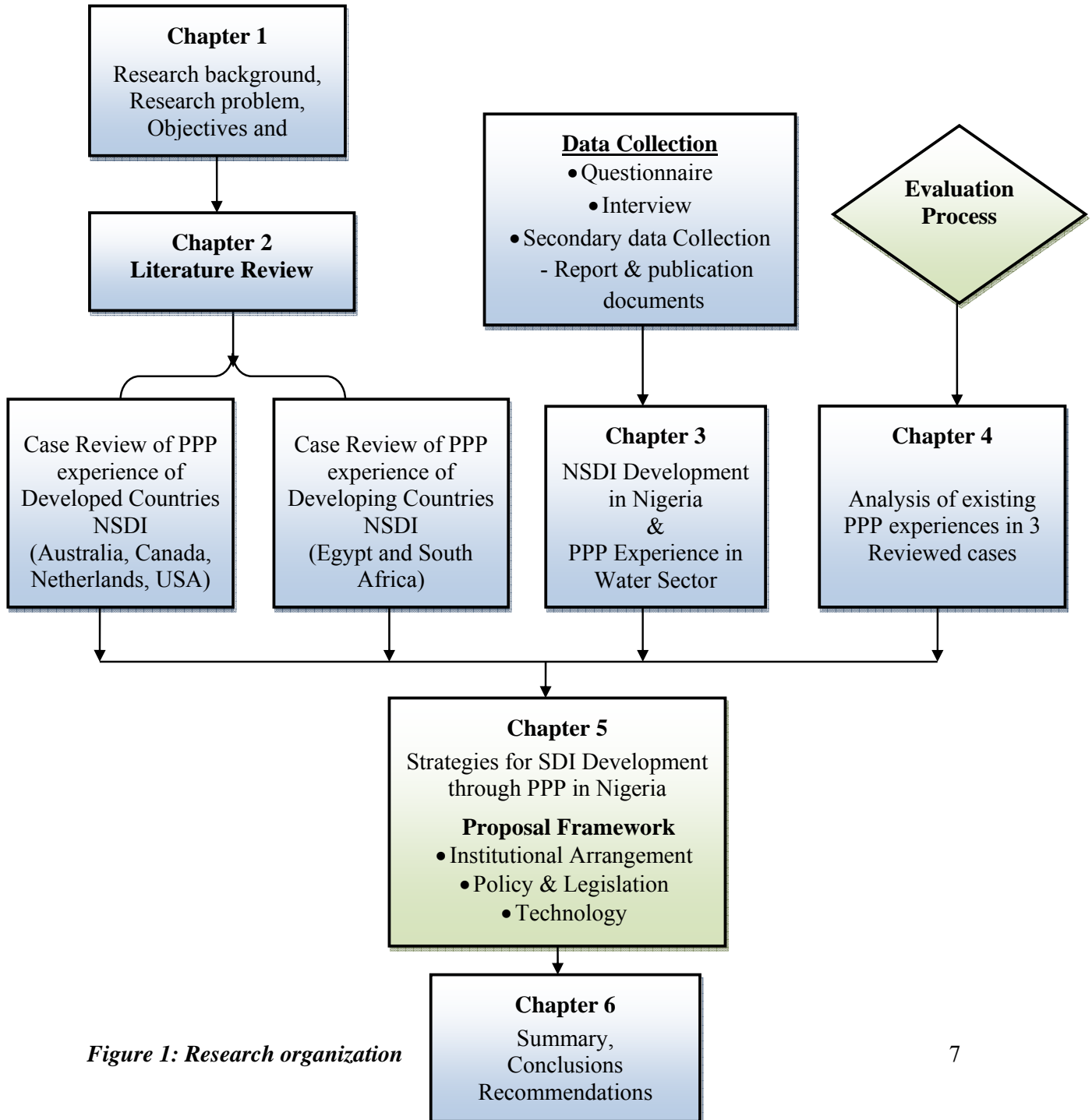


Figure 1: Research organization

2. Public Private Partnerships and National SDI Development Experiences

2.1 Introduction

Public Private Partnership (PPP) today has become one of the most preferred approaches for public service delivery in both developed and developing societies. Various national SDI coordinating institutions across the world are encouraging this approach for SDI development because of the maximized benefits for development through collaboration (World Bank, 1999, ANZLIC, 1999) and enhanced efficiency (Brinkerhoff, 2002). Hence, PPP is perceived as an important approach for promoting development in many countries and sectors (Paoletto, 2000).

This chapter therefore explores the various definitions of PPP from a broader sense from various literatures. Different models of PPPs used for public service delivery in some countries are also identified. The chapter also goes further step to investigate PPP experiences in selected National SDI initiatives of both developed and developing countries. Due to data availability, therefore, Australia, Canada, Netherlands and the United States of America (USA) were selected for such investigation from developed countries, while for the same reason, Egypt and South Africa on the other hand were also selected for developing countries. It critically looks on the “how and where” the private sector is involved in the national SDI initiatives of the selected countries in order derive some aspects that might be relevant to public private collaboration in the field of SDI development in Nigeria. A summary of the lessons learnt and comparisons of the various case reviews are also provided at the end of the chapter. The NSDI development as well as PPP experiences of Nigeria in water sector will be treated in chapter 3.

2.2 Definition of PPP

Different literatures show that a generally acceptable definition for the concept “Public Private Partnership” is yet to be resolved by researchers. Presently different researchers have defined the concept in several ways, thus stressing various aspects of PPP as they derived from different contexts and view points (for example, Bennet and Krebs 1994, Sellgren 1990, Collin 1998, Stern and Harding 2002, Broadbent and Leughlin 2003, Webb and Pulle 2002, Klijn and Teisman 2004 & 2005). For instance, Klijn and Teismans’s (2004, p. 147) as well as Grimsey and Lewis, (2007) describes PPP as a *“risk-sharing relationship based on a shared aspiration between the public sector and one or more partners from the private and/or voluntary sectors to deliver a publicly agreed outcome and/or public goods and services to the citizen”*.

Researchers who defined PPP concept from the above perspective however tends to focus on the procurement aspect of the arrangement which is considered a narrow definition in the context of this research. However a more acceptable and broad definition of the concept is given by the report of the United Nations (2003b) and that of the National Council on Public Private Partnership (NCP,2005). In this broader sense, the concept PPP is therefore defined as *“a collaborative relationships between the public and private sector agencies, in which both parties under a formal contract agreement accepts to work together to achieve a common purpose/goal or undertake a specific task and to share risks, responsibilities, resources, competencies and benefits”* (UN 2003b, NCP, 2005).

The above definition is more general and is therefore adopted for a clear understanding as well as for better grip of what the concept reflects in the context of this research, as an approach for SDI development.

Public Private Partnership may serve several purposes, among which may include for instance advancing a cause, implementing normative standards or codes of conduct or to share and coordinate resources and expertise (UN 2003b). Partnership of this nature may also consist of a single or sets of activities or even long term alliances and consensus building with each collaborating institution and its stakeholders.

In summary, the review of the broader definitions of PPP from the approach adopted depicts some common features which are essential for the effective public service delivery such as SDI development which is beyond the capacity of a single organization or sector. First, cooperation, PPP is always cooperation and collaborative relationship between different organizations or sectors. Second, public entities in this relationship are often involved in partnership with the private sector counterpart for mutual benefit of partners. The private entities may include business or even not-for-profit organizations, development agencies as well as international organizations with common understandings and goals for undertaking or delivering a specific public service like SDI that might go beyond the other party's capacity.

Finally, there must be active participation and strong commitment among parties involved in PPP arrangement. This is essential not only for establishing PPP but strong commitment brings success to partnership. To ensure commitment, performance of each partners should be monitored regularly as defined in the formalized business plan and/or contract.

2.3 Model of Public Private Partnership Arrangement

PPP often exist under different forms depending on the goals of the partnership in a country. Despite its form, there must be absolute clarity as regards to the input, tasks and

responsibilities of all partners involved in the relationship (Webb and Pull, 2002, Grimsey and Lewis, 2004). This can be easily accomplished in a country through the provision of supportive legislations and policies. For example, the Czech Republic government supports the introduction and adoption of PPP in any sector where the approach can bring advantages to its populations in the effective delivery of public infrastructure at both the central and regional government levels (Grimsey and Lewis, 2004). The government in the above case (Czech Republic) plays the role of a partner in the relationship and at the other times as customers while buying services delivered by the private sectors. The private sector is responsible for delivering public infrastructures at its own cost while the government, serving as the client, is required to make regular fee payments to the private sectors in exchange for such investment until the end of the PPP agreement (Helikarova, 2004).

Similarly, the British model of PPP is the Public Finance Initiatives (PFI). Such model entails a considerable capital expenditure by a contractor towards the delivery of public service or infrastructure. The private sector is expected to make investment towards the development of a productive asset like buildings, hospitals, roads or other physical public infrastructures including ICT infrastructures. This arrangement has become common in the United Kingdom because it allows the government to develop and acquire new physical assets like hospitals as well as infrastructures like schools without any tax increment or cost of service delivery.

Although the models of PPPs in use in many countries for public infrastructure delivery are inexhaustible, table 1 shows the models of PPP common for deliveries of public infrastructure in Canada.

| No | Mode of PPP | Explanation and key features |
|----|------------------------------|--|
| 1 | Design - Build | The private sector is to design and build the infrastructure according to an agreed contract terms (e.g price) set by the public sector. The public sector is the owner of the asset and, at the same time, is saddled with the responsibility for its operation after construction. |
| 2 | Build Operate Transfer (BOT) | The facility is build by the private sector according to contract specification, operate the same facility for defined period of time and then transfer it to the public sector at the end period specified in the contract. |

| | | |
|---|--|---|
| 3 | Design –Build- Maintain | DBM is similar to DB except that the maintenance of the infrastructure for some defined periods is saddled on the private sector. The public sector owns and operate the facility but does not bear any maintenance risk that might arise within some agreed and specified period of time. |
| 4 | Operate & Maintain Contract | A private entity is under contract for the running of a public infrastructure or asset for a specified term while the asset is still owned by the public sector. |
| 5 | Finance Only | The infrastructure project under this model is funded by a private financial institution using different approaches like issuance of bond or long-term lease. |
| 6 | Design, Build, Finance & Operate | The private sector designs finance and builds a new infrastructure through long-term lease, and thereafter operates the infrastructure or facility during the period and terms of the lease. At the lapse of the lease the public sector takeover the infrastructure from the private sector. |
| 7 | Lease, Develop & Operate | The private sector is leased a public facility to develop based on an agreed upon standard with the public sector. The private sector under this model is also in-charge of the operation of the facility until the contract/agreement is terminated. |
| 8 | Build, Own, Operate and Transfer | Under this model, authority is given to a private entity to fund, design, build and operate an infrastructure or facility for a defined period and later transfer ownership to an agreed public sector. Also the private entity is given authorization within the defined period to charge service fee on the facility before transferring ownership back to the public sector. |
| 9 | Build, Own, Operate | The private sector under this arrangement is to design; build a facility and is responsible with the on-going operation of the same facility. Also public controls are clearly outlined in the original contract agreement as well as regulatory procedures for the operation of the facility. |

Table 1- PPP Arrangement Models – Canada Examples Based on CCPP, 2004

2.4 Definitions of Spatial Data Infrastructure (SDI)

SDI is playing a broader role for today's information highways as it advances from being only a concept to becoming a key infrastructure for supporting land administration in various countries of the world. Different definitions about the concept "SDI" have been provided in several literatures by various researchers and national government agencies.

SDI as a concept therefore denotes the collection of relevant technologies, policies, people and institutional arrangements necessary that facilitate the availability and accessibility of geospatial data (Groot and McLaughlin, 2000). It offers the base platform for "spatial data discovery, evaluation, and application for users and providers at different government levels, sectors (commercial and non profit sectors), academia and by the citizens" (SDI Cookbook, 2001).

The Canadian Geospatial Data Infrastructure (GeoConnections, 2004) defines the "Canadian Geospatial Data Infrastructure as comprising of the technology, standards, access systems and protocols necessary to harmonize all Canada's geospatial databases and make them available on the internet". Groot (2000) furthermore added that "SDI encompasses the complex of institutional, organizational, technological, human and economic resources which interact with one another and underpins the design, implementation and maintenance of mechanisms facilitating the sharing, access to, and responsible use of geospatial data at an affordable cost for a specific application domain or enterprise".

Moreover, the Dutch Council for Real Estate Information (RAVI) on its part defines the "Dutch National Geographic Information Infrastructure as a collection of policies, datasets, standards, technology (hardware, software and electronic communications) and knowledge providing a user with the geographic information needed to carry out a task" (Masser, 1998b,p.48). Australia New Zealand Land Information Council (ANZLIC, 1998) also relates national spatial data infrastructure to four core components – institutional framework, technical standards, fundamental datasets and clearinghouse networks" (ANZLIC, 1996). An examination of the various definitions therefore reveals some fundamental components of SDI as discussed in section 2.7.

2.5 Components of SDI

Before SDI can effectively serve their purpose as a tool for land administration and sustainable economic development, certain key components are essential. The key components of SDI according to the Australia New Zealand Land Information Council (ANZLIC, 1998) include principally of "institutional framework, technical standard,

fundamental datasets and clearing house networks”. The institutional framework delineates and defines both the administrative and policy structures essential for the creation, maintenance, application of the standards and accessibilities of all fundamental datasets in the system. The technical standards also delineate the technical features of the fundamental datasets while the fundamental datasets are developed within the institutional framework and must adhere to technical standards. Finally clearinghouse network is the platform through which the fundamental datasets are made available to the general public according to laid down policies and technical standards within the institutional arrangement.

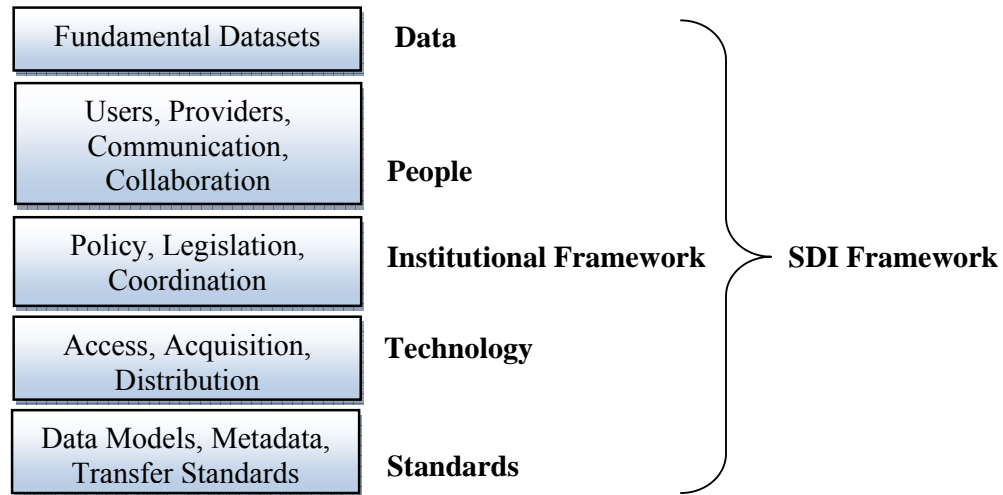


Figure 2: SDI Framework and Core Components (Warnest, 2005. pp.4)

Apart from other fundamental components, people (including partnerships) also constitute an SDI element. The people component include the users of spatial data, the providers and other agents that in between the system often adds value to the datasets, and also drives the development of SDI (Williamson et al, 2003b). It is paramount to note that the various components, as identified and represented in figure 2 above, are not the only factors having impact on SDI, nor do they constitute a completely structured SDI model. The complex integrated framework depicted in figure 2 above are identified and segmented to isolate the various institutional related elements of each SDI components as well as for easy discussions of the various components in the subsequent sections.

2.5.1 Data

Datasets that can be utilized for more than one purpose and in several applications are termed “fundamental data, core data, reference data or base data”. They are regarded as the basic datasets supporting key strategic functions of a country or its institutions. Fundamental data are needed to support the activities of several users, sectors (public and private), corporate

institutions. Datasets that are considered as fundamental data includes cadastral data, geodetic control, administrative boundaries, geographic names among others (Jacoby et al, 2002).

These form of datasets are needed for several purposes and are considered as such fundamental depending on the priority of the responsible institutions. Another form of datasets which are often gotten from the fundamental datasets are referred to thematic datasets (SDI Africa, 2004). However no single entity or organization can easily assemble or collect all these datasets effectively without partnership.

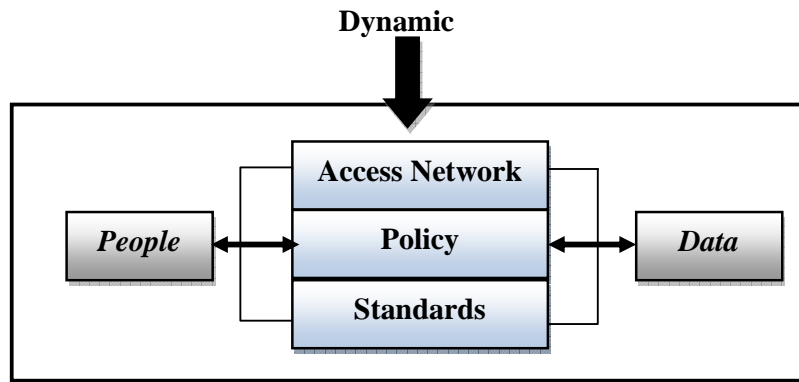
2.5.2 People and Partnership

Apart from the data component, another core component of SDI is people (including partnerships). The people component include the users of spatial data, its providers and other agents that in between the system they adds value to the datasets as well drives SDI development (Williamson et al, 2003b). The development of SDI at any level whether national, state or local often entails formation of partnerships in order to ensure the realization of such vision in a country (Williamson, 2003).

The people component is often regarded as the key driver to both data transaction processing and decision making. According to Nebert (2004), “every decision needs data and, as data become more volatile, human issues of data sharing, security, accuracy and access therefore creates the need for more defined relationship between people and data”. Public administrations using standards reduce data duplications among sectors. It also plays the roles of managing spatial information on behalf of other parties, helps in the creation and provision of sound SDI policies as well as easy access to geospatial data (Thompson et al, 2003). Proper public administration is essential for a successful SDI development by ensuring effective coordination and exchange of geospatial data required for decision makings by different sectors.

2.5.3 Institutional framework and Policies

As stated earlier, the institutional framework often defines the administrative and policies essential for “building, maintaining, coordinating, accessing and applying the standards and datasets” (ANZLIC, 1998). Furthermore, the policies defines other relevant SDI components like data privacy, security, data sharing mechanisms, governance, issues relating to copy rights, data pricing and cost recovery (Nebert, 2006). The dynamic interaction and interrelationship of this component with other SDI components is depicted in figure 3 below.



*Figure 3: Dynamic interactions and interrelationships between SDI components
(Rajabifard et al 2003a)*

The principal goal of SDI is to encourage an efficient production, use and management of geospatial data (Tosta, 1999). This goal can be made possible through effective partnerships and communication between parties supported by appropriate policy and institutional framework. Even when appropriate data and other SDI components are made available, it is still possible for the system not to work effectively without the enabling institutional arrangements and policies to guarantee proper cooperation, coordination and sharing of geospatial data among parties and between jurisdictions.

Within the institutional framework, Doughlas (1997) identifies several key elements which also constitute this component to include the following:

Leadership

It is often necessary that an institutional structure be identified to lead the champion the development of a national spatial data infrastructure (Doughlas, 1997). For the success of PPP, it is essential that political leadership must support it. This could assist in the implementation of PPP. A political leader can help in this regard to reduce misconceptions as well as resolve any conflict that might arise between parties in the relationship.

Funding

For the success of an SDI initiative, a mechanism for funding should be established. The ideal situation, according to Doughlas, will be to collaborate with the private sector in such situation while the government should be allowed to play the regulatory role in the partnership.

Custodianship

A custodian of the fundamental dataset “ is an agency having the responsibility to ensure that a fundamental dataset is collected and maintained under conditions and in a format that conforms to standards and policies established for the national spatial data infrastructure” (Doughlas, 1997).

Data Distribution

This involves institutional issues related to establishing directives and policies required to make the data affordable. It embraces policies that relates to the mechanisms of distribution, pricing, copyright, intellectual property right and privacy.

Education and Training

Occasionally, during the designing and development of an infrastructure, it might be established that shortage of well trained and educated people exist and is often a limitation to a successful implementation of the infrastructure. However, to fill the identified gap, an appropriate training and education is therefore necessary in order to facilitate the development of SDI. To achieve this goal, the public sector can collaborate with the private sector in order to provide such specialized training needed in a country.

2.5.4 Technology Component

Technology has differentiated itself as one of the most important drivers in the evolution of SDI concept (Warnet 2005). It is one of the core components of SDI which according to Rajabifard and Williamson (2001) comprises of the access and distribution networks, clearinghouses and other avenues used for making geospatial information and datasets available to the users.

Technology also entails the acquisition, storage, integration, maintenance and improvement on geospatial data. SDI, to a large extent, can be developed successfully in a country only if the technology components are functioning effectively (Warnest et. al 2005). According to Warnest et al (2005), the nature of technology is considered to be dynamic due to the speed at which it evolves and develops.

2.5.5 Standard

Consistent standards and policies are needed to facilitate geospatial data integration, distribution, sharing and interoperability. Ensuring consistent standard of spatial data permits their discovery, exchange, sharing as well as usability across the world and between

jurisdictions. Also policy in particular has to be consistent for the pricing and access to geospatial data (Warnest, 2005). According to Eagleson and Escobar, (2003) geospatial data should be standardized in terms of their reference system, resolution, data transfer, data model, metadata and quality. The international bodies that set geospatial data standards and other related specification for access by users include: International Organisation for Standardisation (ISO), Open GIS Consortium (OGC), and Worldwide Web Consortium (W3C) etc. All these bodies often cooperate and collaborate with each other for development of consistent and formal standards for data interoperability across users.

2.6 Review of National SDI Initiatives Fostering PPP Approach in Developed Countries

Since the Executive Order (12906) issued in 1994 by President Clinton, USA on the coordination of “Geographic Data Access and Acquisition”, many countries are playing an active role in the initiatives taking place to create the national spatial data infrastructure NSDI. As argued by Fornefeld et al, (2003), the degree to which the private sector is being integrated in a country’s national activities for the establishment of national SDI often differs. He noted that “the private sector has a role they are able to play in contributing to the development of National SDIs of their countries”. From the developed economies, Australia, Canada, the Netherlands and United States of America were selected for the review of private sector involvement in NSDI of such countries, with focus on the institutional arrangements, policy and legislation as well as technology components of SDI.

2.6.1 Australian Spatial Data Infrastructure (ASDI)

In 1986, Australian Spatial Data Infrastructure (ASDI) was initiated under the support of Australian and New Zealand Land Information Council (ANZLIC) to link users of geospatial information to its providers at all levels. According to Williamson et al, (2004), Australia is characterized by vibrant private sector of geospatial industries. ASDI therefore consists of the people, policies and the technologies essential to facilitate the identification, accessibility, sharing and usage of geospatial information between the public and private sectors across Australia and New Zealand.

Components

Institutional Arrangements

The Australian and New Zealand Land Information Council (ANZLIC) consist of representatives from each of the eight states/territories, another one representative from Australian Commonwealth Government and finally New Zealand is also represented by one

person. Each of the representatives are head of the geospatial information body within their respective areas, ensuring ANZLIC represents all public geospatial data agencies.

a) Leadership

ANZLIC is regarded as the apex intergovernmental Council that leads the collection, management and use of geospatial information in New Zealand and Australia (Busby and Kelly, 2004b). It is responsible for the provision of the framework needed to direct other national bodies inclusive of the intergovernmental Committee on Surveying and Mapping and the public sectors Mapping Agencies (Muggenhuber, 2002). As part of the efforts for ensuring ASDI development in Australia, ANZLIC has been performing its functions working together with all relevant sectors of the government. It has partnership arrangements with the private sectors in different areas, for instance, in developing national pricing, policies guidelines relating to data access, copyright, establishing and defining the roles of all parties as part of its institutional responsibilities (ANZLIC, 2003).

b) Custodianship

The development of large scale topographic maps and cadastral information in Australia are solely the responsibilities of the territory and state government. On the other hand the private organization and geospatial software dealers are responsible for the maintenance of large amount of spatial datasets particularly as it relates to power and telecommunication facilities (Busby and Kelly, 2004a).

c) Funding

ANZLIC places the development of SDI as being equal to any other infrastructure in sectors like transportation, health etc. and, consequently, should be the responsibility of the government in terms of their funding.

d) Education and Training

The provision of professional training and other educations within the geospatial sector in Australia is the responsibility of the Spatial Science Institute (SSI). It is a national professional body formed to pursue education and skills development in collaboration with the Department of Education, Science and Training through the Spatial Science Education and Skill Formation Advisory Committee (SSEFAC). ANZLIC has supported the establishment of the above institution as a way of ensuring the pursuit and development of “relevant policies, access framework and best practices in response to user needs, through

appropriate partnerships with sectors (private and public) and other communities of practice in land administration” (ANZLIC, 2003).

Policies and Legislations

The ANZLIC policy statement emphasized the need for cooperation and partnership in the implementation of ASDI and also as one of the guiding principles for effective management of spatial data within Australia. The development of SDI in Australia was also done taking cognizance of data access policies and procedure such as the data access principles and privacy in the system (Busby and Kelly (2004a). In this regards certain laws and Acts were enacted in the country to take care of this fact. For instance, the Freedom of information and privacy amendments Acts which were all enacted in 1982 and 2000 respectively, to protect the right of data users, including the private sectors.

a) Freedom of Information Act

The Freedom of Information Act (FOIA) as enacted in the country in 1982 was directed towards providing Australians access to information with the exclusion of data related with national security.

b) Privacy Amendment Act (private sector)

Similar to FOIA, the privacy Amendment Act in 2000 was also for the purpose of giving individuals the right of access to records and data concerning them and which are in the hand of the private parties.

c) Pricing Policy and Spatial Data Access

The above policy was first announced in 2001 while its full implementation in Australia started in February, 2002. However, the principal goal of the policy was to make all spatial government data available for use at a marginal cost of distribution as well as under unrestricted terms of use for the general population (Department of Industry and Australian Government, 2004). Apart from the above, other critical elements or goal of the policy as summarized by Busby and Kelly (2004a) include:

- maximization of the socio-economic and environmental benefits through substantial investments in spatially referenced data in Australia,
- meeting the rise in citizen’s expectations for online services and information access
- Addressing both natural resource and environmental depletion and degradation respectively in Australia

- Protecting Australian citizens through measures in place to counter terrorism, hazard risk assessment and emergency response to disasters.

Technology component

SDI in Australia, likewise other parts of the world, is moving towards web based services and, as result new technologies and international standards, such as ISO 19115 and OGC catalogue service specifications, are emerging to respond to changing and growing users expectations. The data policy for land administration and approach to e-government in Australia relies on certain fundamental principles that ensure consistent application and deployment of information and communication technology in government functions as well as other public administrations (ANZLIC, 2003)⁶. Through dual principle, the citizens can decide between electronic service and paper based transactions in the system as result of constant changes in technology.

2.6.2 Canadian Geospatial Data Infrastructure (CGDI)

Public Private Partnership is a major approach used for the development of the Canadian Geospatial Data Infrastructure. Private sectors collaboration in Canadian Geospatial Data Infrastructure exists in production services such as mapping, surveying services and land administration mapping (Cooper, 2004b). These services were in late 1970's subcontracted to the private sectors in Canada. At the end of 1980's, majority of the surveying services and mapping productions responsibilities in Canada shifted fully from the government (public sector) hand to the private sector. The above also resulted in a change of government priorities from data collection towards database management and updating in the hands of the private sectors. Nichols et al (1999) has also the opinion that the partnership of the public with the private sectors in most services made CGDI an international model as well as enhances access to geospatial data and usage, both within Canada and across the rest of the world.

Components

Institutional Arrangements

The Canadian Geospatial Data Infrastructure is known internationally as a “leading edge approach to sharing data amongst public and private sectors in as distributed system”

⁶ ANZLIC (2003) – Version 2.6 final draft of Australian Spatial Data Infrastructure Network Distribution: the Internet framework technical architecture, 2003.

(UNESC, 2009)⁷. Although cooperation and collaborations between relevant sectors and agencies was the major approach in the development of CGDI, however the approach reflects the governance structure in Canada, where decision-making and spatial information required to sustain it, is spread across a confederated structure. Hence, collaboration among parties is central to CGDI development in Canada, with GeoConnections functioning as the key hub and central organization for the running of the infrastructure. Other important features obvious in the CGDI are highlighted further under the following institutional elements below:

a) Leadership:

Since CGDI began in mid 1990's, the Canadian Council of Geomatics has championed the development of CGDI through a national partnership initiative in Canada. GeoConnections is a national partnership initiative established to support the development of CGDI as well as to be used as an avenue to respond to challenges associated with cultural advancement and technologies that support the integration and sharing of geospatial data (UNESC, 2009). The development of CGDI in Canada under the national partnership initiative (GeoConnection) is also supported by Inter Agency Committee of Geomatics (IACG)⁸, Geomatics Industry Association of Canada (private sector firms) and academia. As noted by Nichols et al., (1999) the collaboration of relevant stakeholders in Canada has among other things helped in ensuring efficient and effective utilization of geospatial data in the country.

b) Custodianship

Geomatics Canada is the key agency responsible for the maintenance and provision of cadastral framework for specified Canada lands. The cadastral framework is assembled from the Canada Land Survey Record, registration and location sketch archived in the Canada Land Survey Records.

c) Funding

According to Giff and Coleman (2002), SDI concept requires not only the support of the government for its development but a joint contribution of the public and private sectors to their funding. GeoConnections programs, like other critical programs in Canada, are funded by the government and approximately \$60 million was launched in partnership to implement CGDI development only in the second phase. The partnership was delivered by the private sector and academic community and the government in order to fund CGDI development

⁷ UNESC (2009) – United Nations Economic and Social Council: A Paper presented by GeoConnections Canada between 10-14th August, 2009 at the ninth United Nations Regional Cartographic Conference for the Americas, New York USA.

⁸ IACG is an inter-departmental federal coordinating body for effective and efficient utilization of geomatics with the Canadian government.

programs and priority improvements on activities associated with user access to geospatial data, infrastructure and technology, and policy and coordination in Canada.

d) *Education and Training*

GeoConnection strongly advocates the use of education and training as a means for closing gaps in manpower shortage in the fields of Geomatics. GeoSkills is one of the programs implemented by GeoConnection for the development of CGDI in Canada. Like the Geopartner, which is “an industry collaboration program targeted to bring together expertise and technology to spur the development of new technologies (services, tools and applications) for CGDI”, the GeoSkills works with private industries, public sectors and academia to promote geomatic skills and career, support geomatic practitioners development and advancement of Canada’s geomatic industry. It also supports opens consultation and collaboration among stakeholders (Cooper and Coleman, 2003).

Policy and Legislation

GeoConnections in its role also brings together the Canada's geomatics communities, including the private sector and academia, to agree on policies and legislations that simplify data pricing, licensing, sharing, and access in Canada (Cooper, 2004). The key policy and legislations, playing a role in creating access to geospatial data in Canada, amongst others include:

a) *Access to Information Act*

The Access to Information Act was promulgated in Canada in 1983. Its principal goal was to provide the Canadians, the right to request and receive copies of relevant records held by any government bodies and also with, right to withhold any confidential record (Banisar, 2004).

b) *Spatial Data Access and Pricing Policy*

Most institutions in Canada charge some fees for geospatial data to customers. The fee attempts to recover cost for geospatial data creation and dissemination. Not only in Canada, the above situation has been a source of recurring frustration on the part of GIS users in the private sector in most countries of the world (Banisar, 2004). The origin of the cost recovery policy can be traced to the concept of “Crown copyright” where the government has the copyrights to geospatial data and information it creates, inclusive of the intellectual property. The situation emanates, partially from the view that government

needs to maintain control of its geospatial data for integrity of such information as well as for revenue generation.

Technology

Known across the world for its vital role played in building Canadian Geospatial Data Infrastructure, GeoConnections can be regarded as model for other countries to imitate in the development of their national SDI. With better broadband and interoperable system infrastructure, GeoConnections is associated with technological and cultural advancement that facilitates the integration and sharing of geospatial data and services by making Canada's geospatial information readily available on the web.

2.6.3 The National Geographic Information Infrastructure (NGII) – The Netherlands

“The Dutch NSDI can be described as the result of various initiatives taken in a bottom-up approach for more than 10 years. Different stakeholders take initiatives and eventually reach agreements for collaboration and elaboration. Different actors are actively involved and the NSDI is of a very dynamic nature but was, until recent, without legal steering” (INSPIRE State of Play Report, 2007).

The national framework for geoinformation as was approved by the Dutch Council of Ministers was developed by the Dutch Council for Real Estate Information (RAVI) in 1992. The national framework was aimed at increasing the compatibility and exchange of core datasets with relevant stakeholders including the private sector.

According to Kok and Loenen, 2000, three key providers of geospatial information exist in the Netherlands and include the Topographic, Cadastral Agency and the Statistical Bureau. The Large Scale Base Map of the Netherlands (GBKN) is a PPP model that comprises of the Cadastre, the utilities, the municipalities and the water boards (Kok and Loenen, 2000).

The Dutch government decided in 1990 that the Netherland cadastre and base map production should involve the private sector for its operation and that cost should be covered from the product or service provided. The zeal to produce a base map for the country was a priority in the agenda of the government in 1992 and consequently a partnership framework was launched for its production at that time. All parties to the production process accepted the conditions of the partnership framework, including “the apportioning of financial support: utility companies 60 percent, municipalities 20 percent and the cadastre 20 percent”. However a public private model as captured in figure 4 was created to serve the provincial working

group and subsequently a new organization (the national partnership for the base map) was introduced in the system.

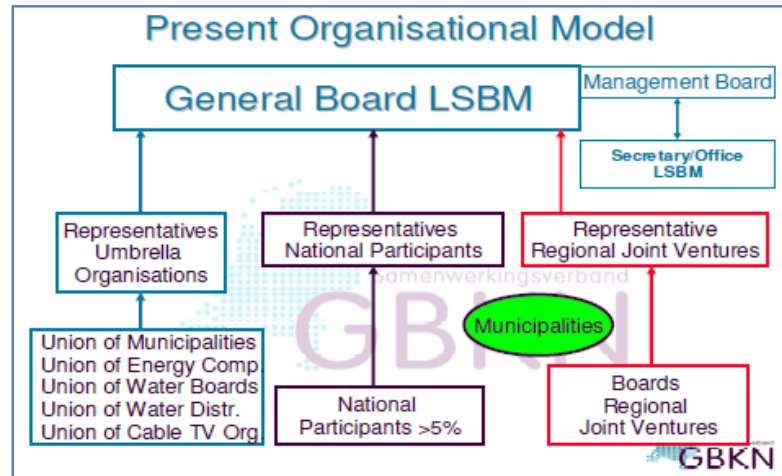


Figure 4: PPP Organizational model for GBKN in the Netherlands

(Adopted from Ir.L.M Murre, 2005)

According to Murre (2005), the task of the national partnership for the base-map during the time of launch was to assist the “regions where municipalities gave only low priorities to the base-map and to initiate the process of map-making in those regions where the progress was too slow” (Murre, 2005). Already there is a great positive impact and progress had been made within couple of years of the national partnership, as a result, more than 60 percent of the The Netherlands are covered by the map as at 1995 (Eekelen, 2001).

Components

Institutional Arrangements

a) Leadership

The appointment of a coordinating Minister for Geographic Information in 1999 gave rise to the formation of a consultative body in the Netherland known as “the Dutch Council for Real Estate Information” (RAVI). The body consists of a scientific advisory board and conglomeration of all public agencies; private sector companies and local authorities (INSPIRE; 2007). The Dutch Council for Real Estate Information (RAVI) is playing a leading role in the development and shaping of National Geographic Information Infrastructure in the country (Kok and Loenen, 2004). This role as played by RAVI has been taken over by a new body (Geonovum) presently.

b) Custodianship

The Dutch Land Registry office or Cadastre since 1994 has been a self administering state body which by implication under a public law is regarded a legal entity. The body is in-charge of ensuring that information in the Netherlands as regards to registered properties or relevant parcel data are appropriately entered on cadastral maps and public registers. The Cadastre responsibilities therefore entail planning, registration and maintenance of records regarding to parcel data and cadastral mappings. Moreover, the GBKN being a national partnership for base map was established based on a PPP model and hence its national board consist of officials from the cadastre, boards of municipalities, those of utility companies and of water as well as management boards saddled with the responsibility of reclaimed land.

c) Funding

Dutch Cadastre is an autonomous entity operating under strict business principles, carries out cost recovery and nonprofit making organization. The GBKN production and maintenance costs amount annually to \$400 millions and 27 million euros respectively. Financing of GBKN datasets and costs are done jointly by all Dutch municipalities, Dutch Cadastre, conglomerates of utilities companies as well as Dutch telecom.

Policy and Legislation

Policies and legislations on database, copyright and pricing in the Netherlands are implemented according to prevailing law. However in the country the citizens and other public are entitled to request and receive geospatial information maintained by the federal and private agencies at a reasonable price. The following policies prevail in the Netherlands:

a) Database Legislation

The Netherlands government implemented the database law as enacted in 1999 under the Directive (96/9/EC) of the European Parliament on legal protection of databases. The law gives protection to the producers of databases as well as grants two key rights to them in the Netherlands. According to the above legislations, such right included that:

- The producer has “the right to grant permission for downloading, printing and copying (part of) datasets”.
- The producer also has the right of making datasets available to the public and shall take responsibility of the content and accuracy of such data to the user.

b) Data pricing and Privacy

The privacy law regarded as essential for data ownership, value and use of geospatial information in the Netherland has been in existence since 2001. In terms of data pricing, the government also sells data to the general public and third parties at a rate enough to recover its distribution costs. The National Geospatial Data Clearinghouse (NGDC) often provides metadata to the users without any cost attached but cost recovery charges applies to other data in the system, mainly as source of finance.

c) Copyright Act

The copyright Act does not discriminate between the public and the private parties. Both sectors are free to impose copyright on their geospatial information, provided that the originality of the work is assured. Even at personal level, however, geo-information with ones personal view can be protected by copyright in the Netherlands (Kok and Loenen, 2001).

Technology

The documentation of datasets as well as making them accessible to users is a critical task that can be hampered without effective technology. For such purpose, the National Geospatial Data Clearing house (NGDC) project was started in 1995 by the Dutch Council for Real Estate Information (RAVI). NGDC therefore provide the avenue for accessing datasets available at any public or private domains through the internet. Apart from NGDC supporting the standardization of metadata, it also promotes the application of openGIS technology in the system of making geospatial data easily available and at low cost.

In the Netherlands however, a private company known as Geodan has been hired since 2001 to take charge of the above responsibility of NGDC which became a nonprofit organization. The Dutch geospatial information sector has a vital role to play in the e-government development of the country. The e-government policy in the Netherlands was started in 1998 with the key element being the creation and maintenance of authentic registration (Molen, 2002).

2.6.4 The National Spatial Data Infrastructure (NSDI) – The United States of America

The executive order (12906) issued by the former United States President (Bill Clinton) on Geographical Data Acquisition and Access brought a wake-up call across various countries of the world for the establishment of National Spatial Data infrastructure. The Federal

Geographic Data Committee (1997) therefore defined the United States National Spatial Data Infrastructure as the “technologies, policies and people necessary to promote the sharing of geospatial data across all levels of the government, the private and non-profit sectors, and the academic community”. The primary goal for the establishment of such infrastructure is to avoid data duplication among institutions, improve quality as well as decrease relevant costs associated with geospatial information, facilitate geospatial data accessibility by the public, and to create partnerships among states, cities, academia and the private sectors to improve the availability of geospatial data (FGDC, 2008).

Components

Institutional Arrangement

a) Leadership

The Federal Geographic Data Committee (FGDC) was established as an agency to lead the development and coordination of NSDI in the United States. The coordination group of the FGDC consists of chairpersons from various thematic Subcommittees, working group representatives cutting across the private and public sector agencies as well as other recognized stakeholders groups by FGDC. According to the Executive Order (12906) for the establishment of NSDI in USA, the FGDC was mandated to collaborate with the states, local, tribal government, academia and the private sectors in coordinating NSDI development in the country. The above function is to be carried through coordinating “ the development, use, dissemination and sharing of mapping, surveying and associated geospatial data” (OMB, 1990, FGDC, 2008).

b) Funding

In the United States, the majority of the identifiable funding for the development of the country’s National SDI can be traced solely to the federal government, however the support in this regards from the private sector still exist but in modest number.

In order to encourage SDI development in the United States, the FGDC has funded a number of partnership programs in the country. One of such partnership programs is the NSDI Cooperative Agreement Program (CAP) established in 2002. According to FGDC, the NSDI Cooperative Agreement Program (CAP) “is an annual program to assist the geospatial data community through funding and other resources in implementing the component of the NSDI. This program is open to State, local and tribal governments, academia, commercial and non-profit organizations. This program provides small seed grants to initiate sustainable ongoing

NSDI implementations and emphasises partnerships, collaboration and the leverage of geospatial resources in achieving its goals” (US, FGDC, 2002). The FGDC in 2002 alone through the above program has provided “approximately \$386,000 to twenty nine organizations and in four different categories of projects in order to boost SDI development in the country” (FGDC, 2002).

c) Education and training

The Federal Geographic Data Committee periodically publishes educational materials to encourage disseminate new concepts in SDI across the country’s Universities. Also research grants are often provided to consortium bodies and universities in Geoinformation Science Education in order to support in the above effort in Australia.

Policy and Legislation

a) Freedom of Information Act (FOIA)

In the United States, not less than 50 States have one form of legal provisions or another on public access to geospatial data information termed “freedom of information acts” (FOIA). The FOIA in the country therefore establishes a balance between the rights of the United States citizens to be updated with government activities as well as maintains the required confidentiality of some records (Kok and Loenen, 2002a). The goal of this Act is to help to checkmate corruption and to hold people in charge of certain functions or positions accountable to the citizens.

c) Spatial data access and pricing policy

As pointed out earlier, the United States has open access policy to data. According to this policy the general public is unrestricted to receive the information kept by the federal agencies at a fair price covering the cost of distribution of such data. However in that direction, the federal institutions like the National Mapping Division of the United States Geological Survey (USGS) and other agencies such as the Bureau of Census sell the geospatial data to public at a price enough to cover only the distribution costs or expenses (Groot and McLaughlin, 2000).

d) Copyright Act

Notwithstanding that the United States has Copyright policy covering also the Intellectual Property Right on digital geospatial databases however, the “scope and practicality” of such law is still in doubt. This fact is due to what Masser (1998) described as inadequate clauses in

the copyright law. Thus in the United States, most geospatial datasets are little protected by the law of copyright, they are instead more protected by alternative law such as the contract laws and the application of the signed license agreement in order to regulate the use and duplication of such datasets in the system (Onsrud and Lopez, 1998).

e) Legal Issues

The development of markets for government geospatial information by individuals and private bodies is supported by the position of the United States Congress in 1986. The above therefore has encouraged through the copyright policy the distribution and dissemination of government information in the interest of the general public in the country. According to the Executive Order (12906), the Federal Geographic Data Committee was also mandated to collaborate with the private sector agencies in the coordination and development of NSDI in the United States (FGDC, 2002).

Technology

Both the Federal Geographic Data Committee (FGDC) and the American National Standards Institute (ANSI) strongly depends on technology partnerships with both the private and public sectors for the development of NSDI and relevant standards in the country. Also the FGDC through its NSDI Cooperative Agreement Program in 2002 has financed the integration of the clearinghouse with the OpenGIS technology services (FGDC, 2002). Today in the country, the clearinghouse has become a stronghold for the country's Geospatial "One Stop Initiative" (Moller, 2003). According to Moller (2003), the One Stop initiative is an electronic government implementation project with current technologies to bind together e-government and geospatial information. Apart from the above, partnership has also been significant driver in promoting of the system of voluntary standards which are in common use today by many agencies in the United States like the Department of Defence.

2.6.5 Reviewed PPP Lessons Learnt from Developed Countries National SDI initiatives

Three components of SDI comprising of institutional arrangements, policies and technology that are among the critical requirements for SDI development has been reviewed in some selected developed countries (Australia, Canada, Netherlands and the United States of America). The lessons learnt from the above reviews are based on each of the country's NSDI experiences and initiatives fostering PPP in the concerned SDI components in this research. Below therefore summarizes under each components the lessons learnt as thus:

Institutional structure/arrangement

- 1) The successful use of PPP as an approach for strengthening SDI is such a difficult task because of the associated challenges. However for the success of this approach, the parties involved must willingly agree to share both risk and reward in the development. Partnerships are more said but very hard to develop and maintain among people as result of conflicting interest and budget, inadequate incentive as well as political challenges. Hence institution having such discrepancies above often find it hard to compromise and the success of PPP is hampered as a result.
- 2) The beginning phase of public private partnerships often face some challenges in many organizations. Hence it is highly necessary to have an agreed and common motive for the setup of such partnership as well as proper strategy taken in decisions relating to financial contribution as seen in the reviewed case of the Netherlands (GBKN).
- 3) Furthermore a well planned institutional or organizational model is essential for the reason hinging on the definition of purpose, members and responsibilities of the parties (public and private) involved in developing a particular SDI project in a country. This fact is clearly seen also in the case of the GBKN in the Netherlands (figure 4).
- 4) Availability of dedicated and income stream for funding of the project from both public and private partners is vital in SDI development and strengthening in country. In addition, however structuring the financial model that is part of the prerequisite to sound regulatory structure will assist in ensuring transparency and sustenance of the system. In the same manner, the model avails the government room to understand the the private sector projects with adequate planning without foregoing its broader objectives in other sectors.
- 5) Apart from dedicated income stream, PPP also requires official government and political support for the development of SDI. This instance is clear in the United States of America where federal government structure exists that nurtures a sustaining membership for the PPP program. The government agency from time to time conduct policy and technical meeting to support PPP and the geospatial community.
- 6) Private sector collaboration can have important contribution and impact on data collection, maintenance and also on software vendors. The government working together with the private sector as seen in the case of Canadian under its GeoConnection program, has the capacity in advancing the different geospatial services and application in a country.

Legislations and Policies

- 1) For the successful development of SDI through PPP, it is necessary that an established policy and legislation framework exist in order to support and facilitate the collaboration between the public and private sectors.
- 2) Although the pricing policies for data in most countries like Australia and Canada emphasizes on cost recovery, however this can be seen as a barrier since private sector has to pay to have access to such data and is therefore capable of limiting their participation in SDI when compared to the United States of America, with practice of open access model in the system.
- 3) Geospatial data policies such as copyright acts do not discriminate between the public (government) and the private parties as both parties can impose copyright on their geospatial information. The geospatial private agencies and sector in such case has an opportunity to participate in the development of SDI, knowing quite well that their works are adequately protected under the prevailing geospatial data law in the country. This situation is obvious in most of the developed countries NSDIs reviewed.

Technology

- 1) Standards for data are considered essential for facilitating exchange of geospatial data among parties (public and private), sectors and organizations. In the reviewed case of the United States of America for example, the private sector could play a prominent role in developing standards. In this regards, the American National Standards Institute (ANSI) greatly depends on PPP in developing standards of geospatial data. Most Developed countries such as Australia and others adopt international standards like ISO 19115 and Open Geospatial Consortium (OGC) specifications and also moving towards the web services model in order to facilitate sharing of geospatial data between parties and stakeholders.
- 2) Internet has become a major platform for accessing geospatial information in Developed Countries. This platform therefore creates convenience in geospatial data access, data discovery and sharing between the public and geospatial private sectors as well as for meeting users need. In Developed country, the available and robust information technologies also helped in building adequate broad band infrastructure needed for the effective internet communication and connections to geospatial data which are essential for users.

2.7 Review of National SDI Initiatives Fostering PPP Approach in Developing Countries

The recognition of the role of private sector involvement in developing societies is as a result of the positive experiences and impact of PPP in Developed countries (Akingbade et al, 2005). As noted by both Akingbade et al (2005) and Radwan et al, (2005), the involvement of private sector in Developing countries in SDI development has increased over the years particularly on land and other cadastral matters. Hence two countries (Egypt and South Africa) that have better experience than Nigeria in SDI development through PPP have been selected for review from developing countries dimension.

2.7.1 National Spatial Information Framework (NSIF) - South Africa

The National Spatial Information Framework (NSIF) as known today in South Africa is an initiative designed to coordinate the development of national infrastructure required to facilitate the utilizations of geospatial information in decision making in the country.

Likewise other initiatives across the world, the development of SDI in South Africa includes the institutional arrangement, policies, human resources development as well as standards for geospatial information (NSIF, 2009). The Department of Land Affairs was created in 1997 as an agency to coordinate the NSIF development in South Africa and to oversee the linkage of different databases that are under the maintenance of various institutions/agencies using common standard and protocols (NSIF, 2009).

Components

Institutional Arrangements

a) Leadership

Created in 1997, the Department of Land Affairs is responsible for the establishment and coordination of the development initiatives of NSIF in South Africa. The NSIF members consist of surveyors, planners, geographers, IT technologists as well as three “Working Groups or Task Teams on: policies, standards, and educations”.

b) Custodianship

The Chief Directorate of Survey and Mapping as agency under the Department of Land Affairs is the custodian responsible for the topo-cadastral map productions (often on scale 1:250,000) as well as showing other topographic details of South Africa.

c) Education and Training

It is of essence in a country to produce professionals that will encourage the implementation of SDI through education and training. However in collaboration with institutions of learnings

in South Africa, the Department of Land Affairs has facilitated various workshops to educate and create required awareness among students on the need of taking up challenges in the field of GIS and as a means of ensuring that professionals are available for the development of NSIF in the country. With the same goal, the Chief Directorate of Surveys and Mapping also came up with Map Aware Initiative that seeks to promote map awareness and literacy in South Africa. Today Map Trix, Map packs and Map aware workshops are veritable tools used to educate and train South African people on the significance of maps.

Policy and Legislation

Among the policies and legislations enacted to ensure access of geospatial information to both the public and private sectors in South Africa include:

a) Promotion of Access to Information Act (PAIA)

The Promotion of Access to Information Act as conceived by the parliament in 2000 took effect in the country from 2001. The Act gives every every citizen the right of access to information, held by any public or private agency in the country. Apart from providing access right to information, it is also intended to promote the sense of accountability and transparency of among stakeholders of geospatial information and data.

b) Spatial data pricing policy

NSIF policy on spatial data is highly influenced by the promotion of access to information acts and the pricing system is uniform irrespective of the public sector. In this regards, all departments as well as other public agencies of the government is required by the above policy to provide information inclusive of geospatial data on a non-profit basis to the general public. However the purpose of such policy is not to achieve cost recovery from users but to be a platform for making geospatial services and information readily accessible and affordable by charging what it cost the agency to make the data available in the right format as demanded by the user. The price lists of all available services and product exist and hence only the cost such as printing, paper, ink, postage, packaging and transfer medium are recovered.

c) Copyright Act

All geospatial information services and products that emanated from the state are protected by the prevailing copyright Act of 1978 (No 98). In accordance with the prevailing copyright in the state, the private institutions are allowed to use geospatial information services without any specific authorization required. In addition, some liability clauses exist in South Africa to

accompany digital data from department in-charge of the distribution of such spatial information.

Technology

Data standards

In South Africa, the responsibility of administrative support and community collaboration/involvement in the development of standards required for consumer protection and safety is performed by the Standards South Africa (STANZA), as a national body. The collaborative efforts of STANZA with other institutions have brought about various national standards in South Africa such as SANS 19115 for geographical information metadata, SANS 1878 as South African spatial metadata standard (Cooper, 2004a). The Department of Land Affairs has improved its activities through technology. Through existing technology, metadata and other existing resources needed by users are available through the internet.

The Spatial Data Discovery Facility (SDDF) “contains around 3000 records on spatial data holding within both the public and private sector and is searchable through a variety of different interfaces on the internet” (Gavin et al, 2004).

2.7.2 National Geospatial Data Infrastructure - Egypt

The Egyptian Government in the year 2001 took a decision to convert the Egyptian Survey Authority (ESA) to be “Economic Authority, operating on the basis of ‘cost recovery,’ and striving to be fully self-subsidized, generating revenue for the services it provides without undermining its mandate as a national cadastre and land registry agency (Radwan et al, 2005). The above decision was taken in order to improve the national geospatial data infrastructure as well as mapping and cadastre services in the country. Moreover, in 2004 the government also took further actions requesting ESA to give apparent role to the private sectors in its mapping and cadastre activities (Radwan et al, 2005). According to Hussein (2005), the Egyptian cadastre and land registry is designed in such a way that data format in the system are harmonized to ensure that data duplication efforts and conflicts that might arise between different GIS application are reduced and to enable data accessibility and communicability among different applications and sectors (public and private).

Components

Institutional Arrangements

a) Leadership

According to the Egyptian law, the ESA is currently the only institution of the government in-charge of the coverage of the entire landmass of the country with base topographic maps of various scales. In cooperation with other agencies and stakeholders, ESA also plays a leading role in supporting the national cadastre and land registration scheme as well as the development of other national geospatial data infrastructure in the country (Radwan et al, 2005).

b) Custodianship

In Egypt, ESA is mandated to create, maintain and disseminate to both the public and private sector an authentic and current geographic data (topographic, geodetic and cadastral data inclusive) that describes the Egyptian landmass and in doing so it has to provide the information society with the cadastral in the format that it can be used easily. In the country the private sector can play a role in data administration particularly in the development of Urban Cadastre under the responsibility of the public sector as well as prevailing legislation (Lemmen et al, 2005).

c) Funding

Various International donors (USAID and GTZ) have collaborated in the development of several activities of ESA. For example in the TMS/ESA Training Project, the ESA has received funding in cooperation with the faculty of Geo-information Science and Earth Observation (ITC) based in the Netherlands for management development program. The TMS/ESA was a partnership program funded primarily by the Netherland Government and the Egyptian Government. The ITC and ESA in the frame of both countries respectively offer a considerable financial contribution of 200, 000 and 600, 000 Euros towards the various training areas of the project.

Moreover the GTZ, USAID and Finland government also supported the technical modernization of the cadastral operation of ESA. However since 2001, the funding of the Egyptian Cadastral project (ECIP) is also done by the Finnish government.

d) Education and Training

Like in other developing countries, professional development of staff that is needed for the sustenance of the modernization programs carried to enhance cadastral services in the country is currently recognized as the most challenging problem in ESA (Baraka, 2005). To address

such challenges TMS/ESA Training Project was initiated in 1999, with aim at building capacities to improve ESA staff performance and sustenance of the modernization programs of ESA. ITC is the leading partner in the TMS/ESA project, in collaboration with other universities across Egypt.

Policy and Legislation

Spatial Data pricing policy

ESA adapted the cost recovery policy from the decision of Egyptian Government which demanded for such in 2001, when the agency gained autonomy as an economic authority in the public sector as well as a self financed institution (Youssef, 2005). To survive as a self financed institution, the agency had to generate its revenue from its services through cost recovery as well as collaborating with private organizations for rendering diverse and large services which are beyond its capacity as an organization.

Technology

Several initiatives have been implemented to promote the deliveries of cadastral information and functionalities to both the public and private through an online platform. Such services have been implemented in the country in collaboration with the private sectors. An online cadastral portal has thus been proposed in the framework of SDI initiatives in Egypt (Radwan et al, 2005). As noted by Haggag et al, (2005), the buiding of such digital map layer however will make different types of cadastral information available to the public and private sectors as well as make their coordinations easy.

Furthermore, private scompanies like the Quality Standard Information Technology (QSIT) founded in 1994 also plays a role in providing GIS and cadastral solutions as well as consultancy services on different range of professional GIS services such as system design, on-site support and training. ESA is also exploring the feasibilities of collaborating with other private GIS and IT organizations in order to support its strategic and operational information managements as well as other related database and ICT resources (Nasr et al, 2005).

2.7.3 Reviewed PPP Lessons Learnt from Developing Countries National SDI initiatives

The reviews of private sector involvements in the development of SDI in the selected developing countries (Egypt and South Africa) highlight some useful learnt lessons that might provide the necessary requirements for public private collaboration for strengthening SDI development in Nigeria. From the above analysis, the following points are extracted and summarized under each of the three components below:

Institutional arrangements

- For the case of Egypt, where ESA is exploring new strategic direction and therefore seeks improvement actions through invitation of the private sectors to participate and play a role in its mapping activities, it is essential that good communication network is established between relevant stakeholders (public and private) to enable a successful SDI development.
- As seen in all the cases reviewed, however custodianship policy that deals with information needs of both public and private sectors is essential and should be in existence or formulated when absent for the successful development of SDI. Moreover, collaboration should involve “mutual trust and good faith” by supporting good relationship on issues of common interest. PPP is deemed to be successful in SDI development when custodians of data are willing to share data.

Policy and Legislation

- The development of SDI should consider the establishment and implementation of spatial data policy such as copyright, pricing policy and liability. Hence, to strengthen the partnerships between the public and private sector, the established policies must take consideration of the role(s) played by the private sectors. The interest of the private sectors needs to be protected through an existing law. An existing law is often considered a mechanism for building of the private sector trust to participate in public service delivery
- In the case of South Africa, the presence of fixed price lists for geospatial data services has several advantages in the system such as the creation of transparency in the public sector.

Technology

- For quality enhancement and effective delivery of cadastral data, the involvement of the private sector is proposed as seen in the case of Egypt, where online cadastral portal should be established and agencies can post metadata describing their cadastre data and associated land functionalities as well as enable customers to request services through brokerage.
- Private sector can play a role in SDI by supporting in the information technologies required in its development. This is seen in the case of Egypt, where the private sector contributed to the provisions of cadastral solution in the country.

2.8 Comparative Analysis of SDI Development in Developed and Developing Countries

| Similarities | Differences |
|--|--|
| Institutional Arrangements | |
| <p>i) Leadership The coordination activities directed towards SDI development is often the responsibility of a single agency in each case. For example in developed countries like Netherlands and United states this is done by RAVI and FGDC respectively while the same national body (ESA) exist for that of Egypt in the developing country side.</p> <p>ii) Education and Trainings: In both cases, the private sector plays critical role in capacity building by training professionals in collaboration with the public sectors (example Geoskills in Canada).</p> <p>iii) Funding The funding of activities related to SDI development is believed to be the sole responsibility of the government in both developed and developing countries. Though also in most cases, the private sectors however contributes capital from time to time updating, collecting and maintaining geospatial data.</p> | <p>i) Donor Support: Unlike in developed countries, SDI development projects in developing countries are mainly donor driven projects.</p> <p>ii) Private sectors Involvements The involvement of private sector in SDI related activities in developing countries are often low when compared to the developed world.</p> |
| Policy and Legislation | |
| <p>i) Cost Recovery: Excluding the United States, all other reviewed countries from both developed and developing countries often engage in cost recovery which involves the charging of the direct cost of delivering a geospatial product or services to the customers.</p> | <p>i) Data Access policy The arrangement of data access policy in developed countries often facilitate and encourages innovation and competition that adds value to geospatial data unlike in developing countries where the above is totally absent or exist on ad hoc basis.</p> |

| Similarities | Differences |
|---|--|
| Policy and Legislation (Contd...) | |
| <p>ii) Geospatial Data pricing: There is often price discrimination due to the lack of standard price for most geospatial services delivered in both countries (developed and developing).</p> <p>iii) Freedom of Information Act (FOIA): The 2003 survey of FOIA across countries of the world revealed FOIA is operational in developed countries and South Africa from the developing countries side (Banisar, 2004). The implementations of FOIA by these countries often create the required transparency in government and in access to geospatial information.</p> | <p>In this regards, developed country places much consideration to having data access policies and liabilities procedures and principles in the development of SDI than in developing countries.</p> <p>ii) Copyright law: Variations exist in the enforcement and implementation of the copyright policies in developed and developing countries. In this respect, developed countries often places great emphasizes in enforcement and implementation of the copyright law on all information when compared in most developing countries like Nigeria where copyright policies are enforced only for artistic products and information.</p> |
| Technology Components | |
| <p>i) World Wide Web: Though the developing and developed countries operates at different technology levels, however, initiatives for the establishment of clearinghouses that facilitates data exchange and access exists in the reviewed developed countries and South Africa on the otherhand of developing countries (Cromptvoets and Bregt, 2003).</p> | <p>i) Internet Compared with the developed countries, both private and public sectors experienced low level of internet connection in developing countries. They face more problems accessing geospatial data unlike in developed countries in where better internet broad band exist and more system interoperability are possible.</p> |

Table 2: Comparison of SDI development in developed and developing countries

2.9 Summary and Conclusion

In this chapter, the role of the private sectors in developed countries (Australia, Canada, Netherlands, USA) and developing countries (South Africa, Egypt) were reviewed. The above therefore streamlines to PPP concept in SDI development, with particular reference to three components of SDI (institutional arrangements, policies and technology). The institutional arrangement was presented as leadership, custodianship, funding and educational and training and the role played by the private sectors also examined under those issues.

Moreover, the policy and legislation component includes the policies on spatial data pricing, cost recovery, copyright and open access that are essential to enable the private sector to easily upgrade their geospatial data from the public sector counterpart. On the other hand, the technology component addresses issue related with data standards and internet connection necessary to facilitate data interoperability. The chapter highlights some specific lessons learnt as well as and at the same time describes the roles that the public and private sectors play in SDI development in the cases reviewed. The lessons learnt are necessary in order to extract specific PPP lessons that might be adopted for SDI development in Nigeria.

Based on the SDI components, a comparison analysis of the similarities and difference between the developed and developing countries were carried out in the chapter (table 2). Although the case studies reviewed are unique in various aspects, however it is observed that majority of the issues required for PPP in SDI development are similar between developed and developing countries. Both governments of developed and developing countries are recognizing the potential benefits of the involvement of private sectors through PPP for SDI development and is being encouraged strongly.

3. Development of SDI in Nigeria

3.1 Introduction

The role of private sectors in the development of SDI with respect to case reviews of developed and developing countries SDI initiatives were the focus of the analysis done in the previous chapter. This chapter looks at the status and initiative directed towards SDI development, the GI policy in Nigeria as well as the activities involving the involvement of private sector. The chapter also aims to provide answer to the opportunities, challenges and threats for the use of PPP in the development of SDI in Nigeria.

To have a clear grip of the primary case study of this research, the chapter therefore starts with brief information about Nigeria, followed by a description of the overall status of geospatial sectors/industries in the country under three related SDI components (institutional arrangements, policy and legislations and technology) of interest in this research. In addition, a situational analysis is also performed on the geospatial sectors in order to assist in developing strategy for public private collaboration in the field of SDI development in the Nigeria.

3.2 Nigeria in Brief

3.2.1 Geographic Facts

The Federal of Republic of Nigeria is the official name to which Nigeria is known as a country. The country operates 774 local governments and 36 states, with its Federal Capital Territory located in Abuja (9°10'0"N, 7°10'0"E). As one of the microcosm countries in sub-Saharan Africa, Nigeria is located in West Africa and has common land borders with Benin Republic in the West, Chad and Cameroon in the East with and the Republic of Niger in the North.

Nigeria is a vast country with area coverage of 923,768 Sq km, comprising of 910,768 Sq.km of land area and water area of 13,000 Sq. Km (CIA, World Fact Book, 2005). The country's coastal border lies on Gulf of Guinea coast in the South and Lake Chad in the North (figure 5).

Nigeria according to 2003 national census has a total estimate of 148 million inhabitants, and 250 ethnic groups. With diverse landscape and climates, Nigeria is known today as an important center for bio-diversity. The landscape and climates of the country ranges from rainforest, savanna climate in the middle and Sahara Desert encroachment in the far north. To bring development nearer to the people the country operates a decentralized governance

system with three levels of government (federal government, state and local government). The administrative affair of the government at each level is also coordinated by Ministries, Agencies and Parastatals.



Figure 5: Location map of Nigeria (© Oxford Cartographers, 2008)

3.2.2 Economic Situation

Nigeria like other developing countries depends on money from international donors to meet a large part of its national budget. Until 1999, the past years of Nigeria’s independence has been characterized by thirty years of military and unstable democratic rule. Despite the country’s rich oil resources, there has been a consistent declined in public infrastructure development in the country. Nigeria under its stable democratic government since 1999, however has witnessed several government policy reforms that are targeted towards the development of public infrastructure and sharing of spatial information among all sectors of the economy. Notable among such reforms include:

- National Geoinformation policy, aimed at the development of National Geospatial Data Infrastructure (NSDI) in the country.
- Land Sector Strategic Plan (LSSP) for sector wide reforms in land management, conveyance and utilization.
- National Policy on Public Private Partnership crafted to increase private sector participations in the development of public infrastructure.

The establishment of the above policies and other similar efforts by the government are playing a great role not only towards improving the economic situation but also has created high demand for spatial data presently in Nigeria.

3.3 National Geospatial Data Infrastructure (NGDI) and GI Policy in Nigeria

To ensure a more efficient interaction between space technology as well as the accomplishment of the objectives set out by the Nigerian government on the improvement of the quality of life of its citizens and speedy access to real-time data, availability of relevant infrastructures for data acquisition, processing, standardization and dissemination, the NGDI project was initiated in Nigeria on September, 2003 (NASRDA, 2003a).

The NGDI project under the coordination of the National Space Research and Development Agency (NASRDA), an umbrella agency under the Federal Ministry of Science and Technology Abuja, has the principal objectives of discovering, harmonization and standardization of geospatial data production and management and provision of a platform for data sharing to achieve in Nigeria. This is expected to remove the prevailing data duplication in the system as well as save cost and time relating to reproduction of already existing data. Towards the final accomplishment of the goals of the NGDI project, a National Geoinformation (GI) policy had been submitted already to the National Assembly for approval. The GI policy is expected to direct the accomplishment of NGDI development and other initiatives in this direction in Nigeria (full policy document available at www.rectas.org/NigeriaGIPolicy.htm, NASRDA, 2003a).

Moreover, a 27-member NGDI development committee has been successfully inaugurated since September, 2004 in the country. The Committee is saddled with the responsibility of developing the framework, guidelines and standards for the development of National Spatial Information infrastructure in Nigeria. However to ensure effective partnership as well as create a good environment for datasharing and access, the Committee members in the development of NSDI in the country are well spread in terms of geographic distributions of members and stakeholders from various sectors. The stakeholders include those from the private sectors, academia, public institutions at all levels, NGOs in the GI sectors, GI service providers, vendors/users as well as other security/defence agencies in Nigeria (figure 6).

3.3.1 Institutional Arrangement

a) Leadership

The NGDI development project in Nigeria has organizational framework that consists of multidisciplinary, inter-agency and inter-sectoral network of institutions coordinated by a lead agency – National Space Research and Development Agency (NASRDA) (figure 6).

This arrangement is expected in the country to eliminate the institutional barrier hindering GI exchange and sharing among the producers and users in the past. The lead agency shall have authority to enforce rules and standards in sharing and exchanging of geospatial information.

Figure 6 below shows the organizational framework of the NGDI project as proposed by the GI policy in Nigeria. The mapping organizations and key producers in the framework are categorized as node agencies. These agencies are zonal clearinghouses that are networked to the main NGDI server.

Due to the fact that the GI policy is yet to be effected into law, the mandate of NASRDA to enforce rules and standards is yet to be accomplished in Nigeria. Different institutions of government at all levels are still creating their own geospatial data individually according to their required standard and format.

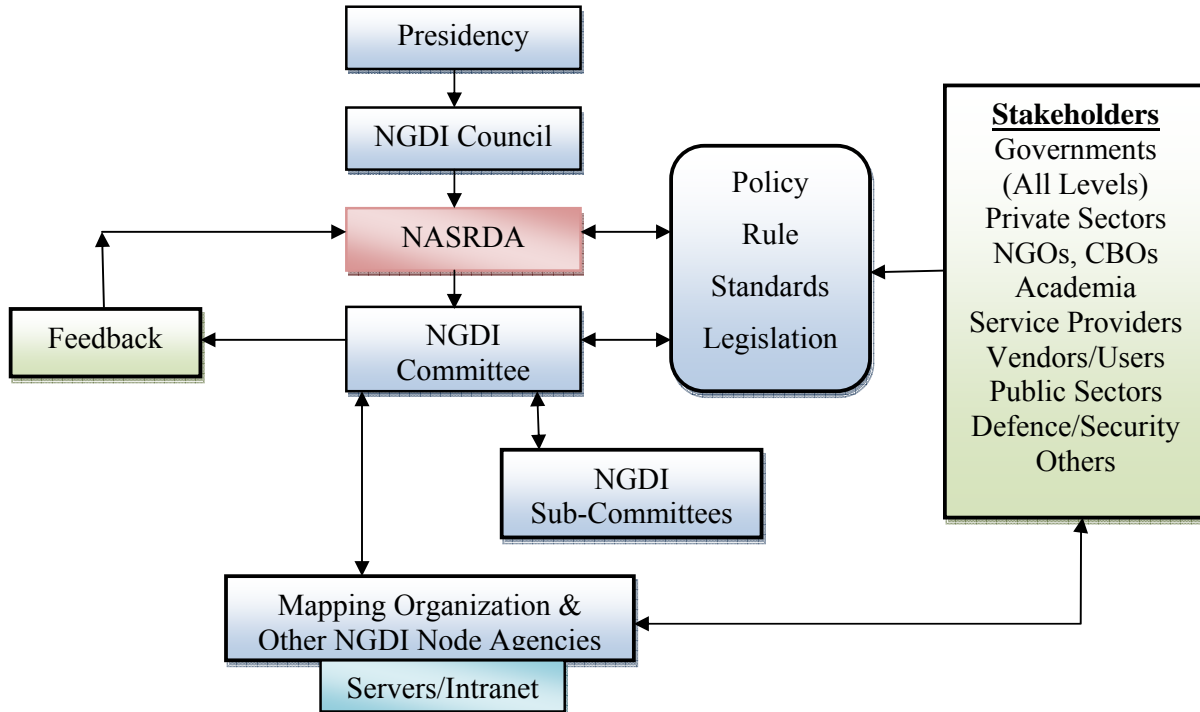


Figure 6: NGDI Organizational Framework (National Geoinformation Policy September, 2003)

b) Custodianship

The realization of NGDI development project in Nigeria according to the GI policy involves a collaborative work with various stakeholders and shall include, but not limited to the following: Private Sector Agencies, Non Governmental Organizations (NGOs), Public institutions, Academia and Research Communities, Service Providers/Vendors, End users, Public Sector Agencies, Defence/Security Agencies and among others.

According to Agbaje (2006), the geospatial stakeholders and institutions that are playing key roles in SDI related initiatives and development in Nigeria are categorized into:

- GI Users
- GI Producers
- Research Organizations

GI data Users

The GI Users form the majority group in NGDI and also attracts more attention. They also benefit from the system in their daily business as well as are important for the success of NGDI in the country (Agbaje, 2006). The GI User group consist of several institutions with diverse background knowledge such as the Physical Planning institutions, Fleet management organization, Tutors and students, Tourism agencies and tourists. Their use of geospatial data also varies in the country. In Nigeria the GI User group can further be grouped into public and private users.

The private users include those groups that expects to make profit from the business of engaging in the production and management of geospatial data. This private group belongs to private organizations and are mostly non- governmental agencies. The public users on the other side include those that provide public services with geospatial data and in this regards are not profit making organizations since they are being funded by either the government or donors to render such public service.

GI data Producers

The Geospatial data producers are those institutions that are saddled with the responsibility of collecting and managing geospatial data. This group is either mandated to do so or make profit from the business of geospatial data management. Majority of GI data producers in Nigeria are government institutions and includes Office of the Surveyor General of the

Federation (OSGOF), Abuja Geographic information Systems (AGIS), NASRDA, National Population Commission (NPC) and several others.

In the country, the NASRDA is the coordinating agency for all satellite image data, whereas the OSGOF is saddled with the mandate of topographic data production and mapping. Also the NPC on their part is responsible for the planning of the various strategic development initiatives and programmes that are necessary to support economic growth, stability, eradication of the poverty as well as enhance sustainable national development in Nigeria. The Abuja Geographic Information Systems (AGIS) center, an agency under the Federal Capital Territory Administration works in collaboration with relevant institutions of the government, local and international agencies with particular responsibility to develop, update and provide reliable land information data required for development planning of the capital city (Abuja) and surrounding districts.

Research organizations

This group in Nigeria includes organizations like the Regional Centre for Training in Aerospace Surveys (RECTAS) and National Institute for Social and Economics Research (NISER) which also an integral part of both GI user and producer. Though NASRDA is not an active producers and users of geospatial data, the NGDI project include them as a vital sector in its successful implementation in the country. Most of the research organizations are required to develop nodes where other producers and users can use them as point of access into the main stream of the infrastructure (Igbokwe, 2005). In Nigeria, the key scientific push in the NGDI development project has professionals within this group. They constitute the major contributors and brain behind the Nigeria NGDI development project both in theory and practice.

3.3.2 Policy and Legislation

- *Spatial Data Access policy*

Transparent access to different types of geospatial data can provide significant information for “countless applications leading to value-added services and market opportunities in a deregulated economy like Nigeria” (NASRDA, 2003). Despite the 1999 Constitution of Nigeria recognising the right of access to information by people, however there is no national policy yet for data exchange in the country. This has been complicated by the non passage of the Freedom of Information Act (FOIA) that has been submitted to the National Assembly for passage since 2003. While awaiting the passage of any spatial data access policy in the

county, most institutions of government presently only share geospatial data or information of such form with those they have memorandum of understanding or have been authorized by the parent ministry at the presidency to do so.

- ***Pricing:***

In definition of whether data should be priced or not, which applicable document and at what cost, are issues to be addressed in data policy in most countries. The pricing structure is mainly for commercialization of geographic data (Gupa, 1999). Nigeria, unlike what is obtained in most developed countries, has no well defined pricing policy for spatial datasets produced by most GI institutions, except for very few agencies like AGIS (Abuja Geographic Information Systems) which have defined prices for their existing spatial datasets. The pricing policy in other institutions often take up some element of negotiation strategy and good working relation in order to get a fair price deal for the required geospatial data. The fact that the GI policy nor the FOIA Act is yet to be passed, Government at various levels and organizations are still creating geospatial data as well as making them available at varying prices and formats to users in the system.

3.3.3 Technology

- ***Data Standard:***

For sharing of information, data interoperability and connectivity of information systems, standardization of data is essential in SDI development. The GI policy Statements regarding data standard in Nigeria emphasized that data structure, quality, format, classification feature coding and metadata content must be in conformity with the Standard Organization of Nigeria (SON) as well as that of the ISO standard (e.g ISO 15046). In addition, the NGDI committee through its lead agency shall also prescribe a set of common standard file formats to be regarded as the National Standard Exchange Format to make the transfer/exchange of data easy.

Presently, due to the non passage of the GI policy, no national standard exist to assist in managing data and exchanging of geospatial information among different organizations in Nigeria. Although the Standard Organization of Nigeria exist as an agency responsible for the development of standards, their efforts over the years has not yielded the expected outcome in the geospatial sector, in terms of data exchange standard.

Under the World Bank and the UK Department for International Development fund assistance, some preliminary data exchange specifications have been developed by SON, in

accordance with the of open GIS consortium and in harmony with ISO/TC 211 standards. However, these data exchange specifications are not yet implemented by any organization in Nigeria due to the absence of binding Act or law for enforcing such on institutions.

3.4 SDI Initiatives in Nigeria

In the past years Nigeria has lunched various initiatives and programs in its efforts to ensure SDI development in the country. Such initiative includes the launch of the Nigeria National Communication Satellite project (NigcomSat-1).

Nigeria National Communication Satellite Project (NigcomSat-1)

Ineffective communication systems are often among the biggest challenge to socio-economic development of developing nations like Nigeria (Kufoniyi, 2004). The implementation of a functional Information Communication Technology (ICT) essential for the capturing, processing, storage, management and exchange of geospatial dataset is regarded among the benefits of a communication satellite and hence the driving force behind the National Commuication Satellite project in Nigeria.

Following the successful launching of the first satellite of the country into orbit (NigeriaSat-1), the Nigerian government began the implementation of a Nigerian Communication Satellite called NigeriaSat-1. The NigeriaSat-1 project is intended to provide the required bandwidth in order to address the telephony, broadcasting and broadband needs and challenges of real time access to geospatial data in the country. “The launch of the project in Nigeria has generated wide spread national attention and stimulated countrywide space and GI awareness, especially among stakeholders and users of satellite data for GI acquisition for socio-economic activities in the country” (Akinyede, 2004). Moreover, for the simple reason that data from NigeriaSat-1 is timely accessible and totally owned by Nigeria, has facilitated research and development across many institutions in the country and is capable of providing a wide range of data acquisition for National Geospatial Data Infrastructure (NGDI) which is an initiative of the government for a GI-based economy for use to improve the quality of life of people and reduce poverty in Nigeria.

3.5 SDI Activities and Private sector Involvements in Nigeria

The role and involvement of private sectors in SDI development in Nigeria is ongoing. The enactment of a national policy on public private partnership in 2005 has further fuelled the growth of GI private sector in the country. Increasingly private sectors are now specialising

not only in the collection but also in the on-going maintenance of government GI databases (Kufoniyi, 2002).

Furthermore, the private sector involvement has included marketing and value-adding in various GI and SDI development activities in Nigeria. This involvement has brought with it challenges for government to balance their control of their information investments with the need to encourage spatial business opportunities (Grant & Williamson 2003).

Several private organizations like Intergraph (an American Software Company), ESRI, and MapInfo have collaborative agreement in Nigeria with different institutions with the goal of combining their expertise in various geoinformation field. The private sectors can play vital roles in the following SDI development areas.

Land Surveying and Updates

The development of Land information system has been central to the achievement of sustainable development in Nigeria.

In June 2008, Nigeria approved the implementation of the Land Sector Strategic plan developed by the Office of the Surveyor General of the Federation (OSGOF). The Land Sector Strategic Plan (LSSP) was developed in order to encourage the private sector play a role in the capturing, processing and updating of land information across sectors as well as incorporating such information into a central national land information depository, to be accessed by users.

Software Distributors and Reseller

The private sector is important in SDI development because of their capability in providing GIS software which is essential platform for working with geographic information. Many private organizations (example Nigeria Delta Systematics Ltd) are authorized resellers and dealers with license to market, demonstrate and provide sell support for GIS software products from ESRI and Mapinfo in Nigeria.

Application Developers and Database Development

Database development is a vital requirement for the adoption and integrated use of geospatial information system in any organization or establishment (Gumos, 2005). According to Gumos, 2005, database development is essential for GIS mapping, modeling, analysis, as well as for sharing of geospatial information to relevant stakeholders. Private sectors have the potential of offering geospatial services such as consultancy services, application development, data communication and design that are essential for cadastral development.

Cadastral database is a central part of the fundamental datasets of NGDI project in Nigeria (Kufoniyi, 2005).

Website Development

Website is a critical platform used for the advertisement of different potentials of an organization to the outside world. Most GI private organizations have established their respective websites for creating awareness in one GI area or the other in Nigeria. It is anticipated that this will give rise to the GI market and their services depending on the response of internet users in Nigeria. As at present, Nigeria has 30 licensed internet service providers. This number is expected to increase in the coming years because of the rising demand for easy access to geospatial information by many organizations to support their business activities.

Capacity building and Training

Geographic information infrastructure makes sense when the data documented are disseminated to users (Gupa, 1999). Private sector in their area of jurisdiction often contributes in publishing GI magazines and distribution of ESRI newsletters to GIS users. This makes people to be aware of the on-going development and provides update on the application of recent GIS software (e.g ESRI software) in the geospatial sectors.

3.6 Situational Analysis of Nigeria's Geospatial Sector

Although the study of SDI development and its status in Nigeria reviews some opportunities which can be tapped through collaboration with the private sector, however several challenges still manifest in the geospatial sector in the country.

SWOT analysis has become an important tool for investigating the general strategic position of an organization/sector, as well as its position in achieving its responsibilities or objectives (Riley and Riley, 2004). The tool is used to describe the strengths, weaknesses, opportunities and threats of the geospatial sector and to facilitate the identification of gaps where collaboration between the public and private sector can be necessary. Also in carrying out this investigation, the feedbacks from administered questionnaires, as well as documented reports about SDI development in Nigeria are put into use.

Table 3 therefore captures the situational analysis of Nigeria's geospatial sector in terms of the available opportunities and challenges, using as matrix array of internal strengths (S) and weaknesses (W), against external opportunities (O) and threat (T), as well as the various strategies for adjusting identified deficiencies. A strategy is "the direction and focuses of an

institution to create a challenging environment to meet up with stakeholders’ demand and expectations through an effective arrangement of resources”. According to Radwan et al., (2001), strategies are changes to be made in order to prevent or correct problems or deficiencies, to emulate “best” practices and execute innovative reforms. Thus they reflect necessary steps to be taken to move from “AS IS” to the “TO BE” as depicted in figure 7.



Figure 7: Bridging the identified gap with strategies from SWOT

It is paramount to mention that SWOT analysis can be very subjective as it is might be difficult by two persons to arrive at the same version of SWOT analysis, even when presented with the same information about the same organization and associated environment. Consequently, SWOT analysis is best used as a guide and not as prescription (Riley and Riley, 2004).

| | <u>Strengths (S)</u> | <u>Weaknesses (W)</u> |
|-------------------------|--|---|
| Internal Factors | <ul style="list-style-type: none"> • Increase use of GIS in public sector. • A single department (NASRDA) is in-charge of geospatial data coordination which is favourable for strong leadership and decision making • Strong zeal and interest of the government in digitalizing the analogue maps, and detailed maps of towns and available schools | <ul style="list-style-type: none"> • Insufficient GIS professionals in the public sector • Absence of clear pricing policy or fixed price list for geospatial data • Lack of awareness of geospatial data existing within other sectors. • High cost and absence of internet connection in several geospatial institutions • Data access to the public is not easy • The emphasis on the use of ESRI software |
| External Factors | | |

| | | |
|--|--|---|
| <p style="text-align: center;"><u>Opportunities (O)</u></p> <ul style="list-style-type: none"> • The underdevelopment of the sector resulting in several GIS projects being carried out by GI private organizations, as well as inflow in foreign donors. • Passage of PPP policy into law, and the establishment of a coordinating agency (ICRC). • The rise in the number of Organized geospatial conferences, workshops and CODI-Geo meetings • The government policy on computer literacy | <p style="text-align: center;"><u>SO Strategies</u></p> <ul style="list-style-type: none"> • Influencing the support of data collection by donors • Proper management and use of available funds • Proposing and seeking of government's approval on private sector involvement on Geo-ICT delivery services under true PPP arrangement. | <p style="text-align: center;"><u>WO Strategies</u></p> <ul style="list-style-type: none"> • Diversification in the use of GIS software from other companies apart from those from ESRI. |
| <p style="text-align: center;"><u>Threat (T)</u></p> <ul style="list-style-type: none"> • Absence of harmonization and coordination of donor support GIS projects in the sector • Losing of political support and absence of geospatial data policies as at present • The inability to bring together different interest groups in the sector. | <p style="text-align: center;"><u>ST Strategies</u></p> <ul style="list-style-type: none"> • Influencing of the government to support and make geospatial data policies capable of promoting data sharing and involvement of private sectors. | <p style="text-align: center;"><u>WT Strategies</u></p> <ul style="list-style-type: none"> • Establishment of coordinating institution for donor GIS support projects • Embarking on sensitization campaign for public officials on SDI concept and the significance of private sector towards SDI development |

Table 3: SWOT Analysis of Nigeria's Geospatial Sector

3.7 Summary and Conclusions

This chapter presents a brief introduction of the primary study region of this research (Nigeria) as well as provides answer to question 3 of the research. The chapter looked at private sector involvement in SDI development in Nigeria as the key purpose of the chapter.

To highlight the situations of the geospatial sector in Nigeria, however an overview of the various GI institutions and the roles they play were also presented. Apart from revealing the institutions in use of GIS software and in custody of geospatial data which today presents opportunity for SDI development in the country, the chapter further highlights some realities of the NGDI project which are not progressing according to the vision of the GI policy of the country. Finally, the chapter goes further by carrying out SWOT analysis as a tool for identifying necessary gaps in Nigeria's GI sector as well as help to figure out essential parameters for public private collaboration in the following chapter. From the various SDI development initiatives, it was observed that SDI concept is highly valued by those citizens and professionals that understand its benefits and, hence, stakeholders generally acknowledged that collaboration between the public private sectors in SDI development has several opportunities and challenges, as captured with the SWOT analysis in the chapter.

4. Methodology Adopted for Data Collection, Analysis and Evaluation of Reviewed Case studies

4.1 Introduction

This chapter presents the approach used for data collection and the evaluation processes of the reviewed PPP cases of countries in SDI development. As a way of bridging the performance gap identified in the geospatial sector and Nigeria's NGDI project in previous chapter 3, the chapter attempts to provide answer to research question 3 by drawing out the requirements and possible PPP arrangement suitable for Nigeria's SDI development.

4.2 Data Collection Strategy

As noted by Kumar 2006 (p.118), there are two key approaches that can be used as data collection sources about a situation, problem or phenomenon. These sources include the primary data and secondary data sources. This research therefore makes use of the above two approaches for data collection from the primary study area.

The primary data are gathered through questionnaire survey and indepth interviews with relevant stakeholders in the GI sector in Nigeria. The secondary data, on the other hands, are collected through review of relevant literature about the country's geospatial sector and PPP approach to SDI development.

4.2.1 Primary Data

- **Questionnaire Survey**

Questionnaire survey is one of the most commonly used methods for gathering information from large number of respondents (Bailey et al., 1996). It is suitable for data collection over large geographical distances as well as for data about the overall performance testing of a system or problem situation (Bailey et al., 1996). For the purpose of understanding the nature of geospatial sector in Nigeria, the extent of private sector involvement in SDI development as well as ascertain the parameters for PPP approach, the attitude of institutions towards PPP approach for NSDI development, a questionnaire was designed around several components of SDIs such as institutional arrangement, policies and legislation and technologies for used in achieving the above goals.

However, a total of 30 questionnaires were sent out to the email accounts of identified senior officers from public, private and academic sectors/institutions across Nigeria for their online feedback.

It is also paramount to note that some of the selected institutions and senior officers, as respondent to this survey, are familiar with PPP approach as well as played active role in one way or the other in the drafting of the yet to be passed GI policy in Nigeria.

There were several limitations noticed during the research data collection process. One of such include the hesitance by most public officials to respond on questions that has to do with the government or those they perceived should be answered by their superiors. Some senior officers on their part also delegated junior officers to respond to the questionnaire in order to avoid their personal information been disclosed. Such hesitation was obvious because of the “oath of secrecy” in operation that hinders public officers in most institutions contacted from disclosing any relevant government information to outsiders. Attempt at overcoming such setback was made by an outright removal of personal information section in the questionnaire and also resending them to the respondents. Consequently response to the questionnaire however increased by 40 percent. Another major challenge centers on how to reach the identified persons as respondent. Some of the potential respondents were not reached because neither their email account nor telephone contact were no longer active or functioning.

- **Telephone Interview**

Telephone interview was adopted as a means of improving the return rate of the questionnaires administered and also plays a vital role for information exchange between the researcher and the respondents. Various stakeholders from the public and private sector institutions were interviewed to ascertain their opinion towards PPP approach for NSDI development in Nigeria. Furthermore due to the fact that capacity building is also a key part of NSDI development, therefore employees of academic institutions involved in teaching of GI related course in Nigeria were also interview for their opinion on PPP.

To ensure that the interviewed is prepared and have idea of what is expected during the interview, the lists of questions is forwarded to them through their email account in advance before the interview. The telephone interview is useful because it acts as an avenue for the researcher to clarify questions with respondents as well as validate certain issues obtained from literature.

Table 3 therefore captures the various institutions that participated in the telephone interviews, as well as in the questionnaire survey, according to the sectors which they represent.

| Public Sector | Private sector | Academia |
|--|--|---|
| <ul style="list-style-type: none"> • National Space Research and Development Agency (NASRDA) • Abuja Geographic Information Systems Center (AGIS) • Office of the Survey General of the Federation (OSGF) • Infrastructure Concession Regulatory Commission of Nigeria (ICRC) • Abuja water board (AWB) | <ul style="list-style-type: none"> • Foundation for Public Private Partnership of Nigeria (FPPPN) • Globacom Telecom, Nigeria Limited • MTN Nigeria Telecommunication Limited | <ul style="list-style-type: none"> • Regional Center for Training in Aerospace Survey (RECTAS) • Universities with GI related courses |

Table 4: Questionnaire Survey Respondents and Organizations Interviewed

4.2.2 Secondary Data

The secondary data in this research are collected through review of published literatures and documents related to the topic under research. These sources emanate from Nigeria’s SDI initiative reports, both SDI and PPP policy documents in Nigeria, Magazines and Newsletters, as well as brochures.

4.3 Results of Data Analysis

This section covers the results of the analysis of the questionnaires collected from respondents and is structured in two parts. In the first part, the descriptive statistics from the survey is presented and discussed to capture the initial results and findings from respondents. Furthermore a benchmarking approach is adopted in the second part for an evaluation of the geospatial sector in Nigeria as well as learning how to improve SDI development in Nigeria along the best practices found in the reviewed cases of selected countries in chapter 2.

4.3.1 Descriptive Statistics and Summaries

A total 30 questionnaires were administered to relevant stakeholders in Nigeria by email. Out of the above total, 20 valid questionnaires were returned giving an overall response rate of 67 percent approximately.

| | |
|--|-----------|
| Number of Questionnaire Distributed | 30 |
| Total Number of Responses | 20 |
| Total Interviewees | 15 |
| Response Rate % (approximately) | 67 |

Table 5: Survey Sample size and Rate of Response

An approximate 15 formal telephone interviews were also made in order to improve on the response rate as well as for clarification of any doubt by respondent during the survey period. Though some of the questionnaires sent out were never returned, however the overall response to the questionnaire was on a very positive side. The strong response rate in table 5 therefore is enough to give confidence to conclusions drawn from the survey as well as further strengthens the findings from the telephone interviews and literature reviews carried out. The descriptive statistics of the results are analyzed under the headings below:

a) Analysis of Survey Response according to Sector

The sector breakdown in figure 8 below shows that 55% of the respondents came from the public sector, 30% from the private and 10% from the academia. NSDI in Nigeria is regarded as a government project; therefore their developments are mostly dominated by people working in the public sector. This fact explains why the trends in the number of respondents are more from the public sectors than others. Although the GI policy with the parliament for passage in Nigeria stipulated that a balance is to be maintained between sectors in the country’s NSDI development, the reality on ground remains that the key institutions that constitute the creators, disseminator and even users of geospatial data in the country, still fall more within the public sectors hand than any other sectors. However the reason of the above unbalance representation of sector, in the case of Nigeria, is not far from the non passage into law of the GI policy by the National Assembly (Parliamentarians).

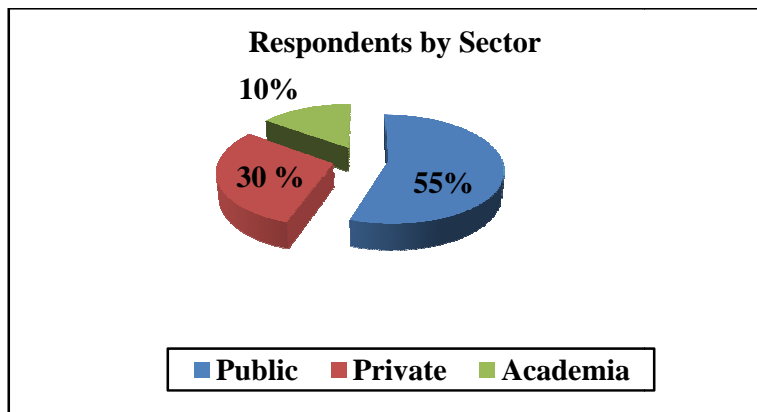


Figure 8: Questionnaire Analysis by Sector

b) Analysis of Respondents Profile according to Position

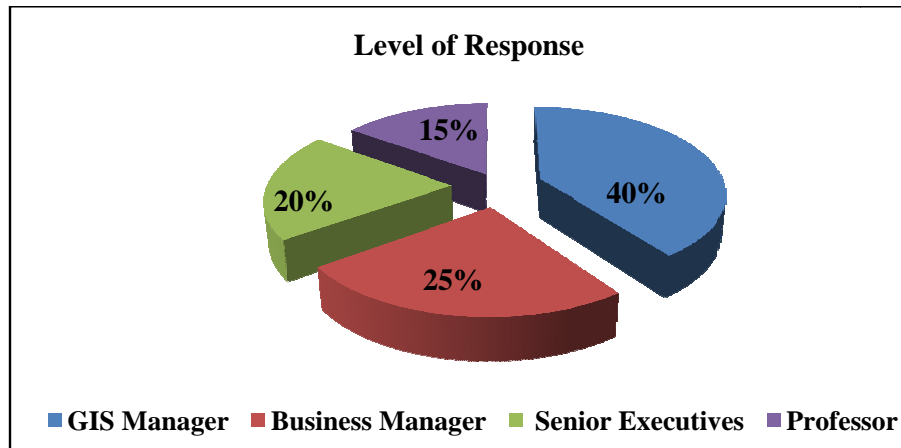


Figure 9: Analysis by rank Profile

The breakdown of positions of the respondents to the questionnaire is depicted in figure 9 above. The largest group of respondents to the survey turns out to be GIS managers who are directly responsible for geospatial information or GIS functions in their respective organizations. The business managers are the next group with the highest number of respondents to the survey. This positive response in the number of questionnaires returned on the part of business managers also highlights the strategic and commercial nature and purpose of geospatial information and data to many organizations.

Moreover, about 20 percent of the respondents also in the executive levels gave feedback on how SDI in Nigeria can be developed successfully through PPP. This number also shows that majority of the respondents surveyed have significant understanding of geospatial activities of their respective organizations and are also aware of the significance of PPP as an approach for public service delivery. Also, there is strong belief and indication that the opinion expressed by these sets of professionals will provide vital suggestions on how the development of SDI in Nigeria could be achieved through the PPP approach. Their suggestion might be regarded as a general opinion or can be generalized since the respondents to the questionnaire survey cut across various professions and sectors as represented in Nigeria's geospatial sector.

c) Analysis of Partnerships and Collaborations

This part of the analysis examined the experience of the organizations in PPP, the experienced challenges/obstacles in the use of the approach as well as motivation for partnership and collaborations between organizations and sectors in Nigeria.

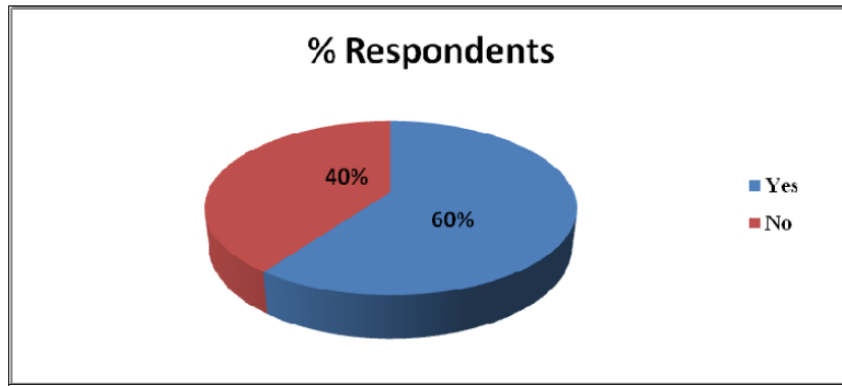


Figure 10: Experience of Organizations in the use of PPP in Nigeria

The figure 10 shows that 60% of the respondents surveyed indicated that PPP is used by their organization for public service delivery while the remaining 40% also indicated in the opposite direction. However, the figure signifies that majority of the organizations have clear understanding of the topic of discussion and hence can offer reasonable input towards how to improve SDI development through this approach.

d) Roles expected of the Private sector in SDI development in Nigeria?

Most of the respondents supported the involvement of private sector in the development of the geospatial sector and also commented that their role in this regards should include that of data generation, capacity building, contribution towards policy making, maintenace and provision of geospatial datasets and GIS software respectively on behalf of the public sector/government. Figure 11 therefore captured suggested roles to be played by the private sector as well as the percentage number of respondents recommending such roles.

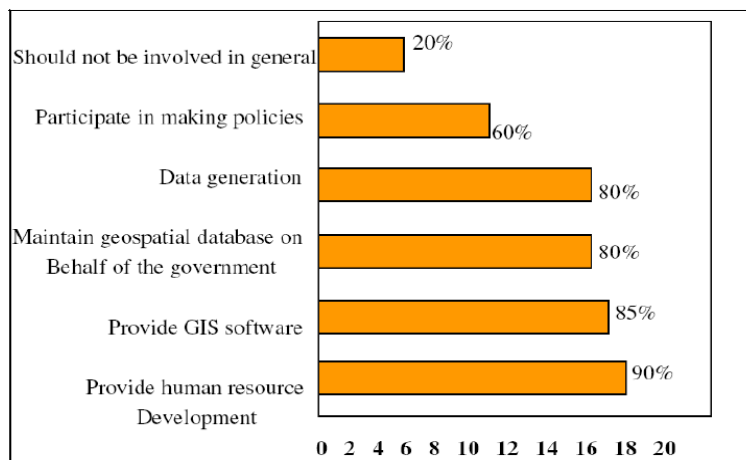


Figure 11: Expected Role of Private sector in SDI development

Figure 11 shows that in general 20% of the respondents are against the involvement of the private sector. Similarly, 60% of the respondents commented that the private sectors should be involved to contribute towards policy making in SDI development while 80% are of the opinion that their role is necessary for generation and maintenance of geospatial data on behalf of the public sector, 85% and 90 % of the respondents agreed that their should encompass that of provisions of GIS software and capacity building (human resource capacity building) respectively.

e) Questionnaire Analysis under Policy and legislation Components

Under the policy and legislation component several questions were asked about the existence of any formal policies for geospatial data sharing and custodian agency responsible for public service delivery through PPP, within which the respondent's organization operate. The analysis of the comments of the respondent towards establishment of formal policy on PPP and that of SDI development in Nigeria indicated that the country started well on this component. There is a general agreement of the existence of formal policy on PPP and national PPP agency (Infrastructure Concessional and Regulatory Commission) that sets guideline for public service delivery in the country. In the same manner the existence of a national SDI agency for SDI development (NASRDA - National Space Research and Development Agency) was also acknowledged by respondent. Although NASRDA was established but the law establishing it was yet to be passed into law and consequently has effect on geospatial data sharing among sectors and organization.

f) Pricing and Cost Recovery

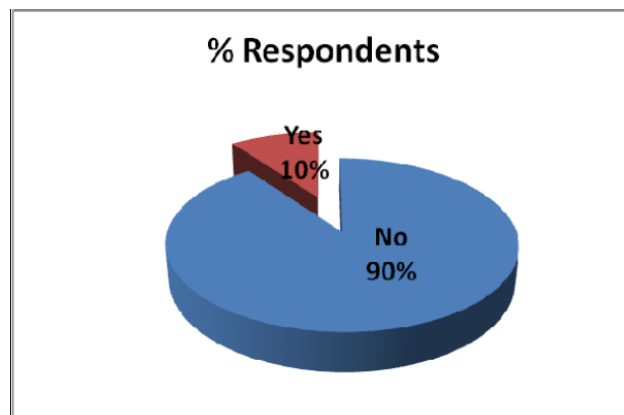


Figure 12: Existence of Geospatial Pricing Policy

The issue of cost recovery and data pricing generated various responses from respondents. About 99% of the respondents (figure 12) accepted that they do not have any form of

geospatial pricing policy in place, due to none passage of the GI policy into law. The remaining 1%, despite none passage of the GI policy into law yet in the country, indicated that they have their own pricing policy.

4.4 PPP Parameters for SDI development in Nigeria

In answering question 3 of the research which involves PPP requirements for a successful development of SDI in Nigeria, an evaluation process of best practices of SDI development for selected and reviewed countries in chapter 2 is carried out.

The evaluation process therefore adopts a benchmarking approach which is based on “the principle of measuring performance of one organization or practices against a standard, whether absolute or relative to other” (Cowper and Samuels, 1997). This process is therefore discussed under institutional arrangements, policies and legislation and technology issues of SDI components which are the focus of this research. Also the outcome of the evaluation process, as well as the analysis result of the questionnaire survey will help in developing proposed guidelines/strategies for future development of SDI in Nigeria through PPP in chapter 5.

Institutional arrangement

• *Political Will and Support*

The support by the government is of great essence for the development of SDI through private sectors involvement. This is clear as witnessed in the reviewed case of the United States where the Presidential Directive (Executive order 12906) by Bill Clinton was used as a support mechanism and in such case the FGDC was mandated to thrcordinate the development of SDI in the USA through the involvement of various institutions including the private sectors. However for the case of Nigeria, the private geospatial sector and industries in the country does not received any strong support from the government and, consequently, has negative impact towards SDI development through PPP strategy.

• *Capacity building*

Capacity building is one of the roles that private sectors render as key driver to NSDI development through PPP in Australia and other developed countries reviewed. The Australian government has vigorously pursue the development of its geospatial sector professionals through the Spatial Information Industry Action Agenda (2001). The Spatial Information Industry Action Agenda was a capacity building mechanism that involves “education and skill formation” that creates and maintains a highly skilled, relevant and

innovative workforce required for SDI development in Australia through the collaboration of all sectors such as the private sectors in such role.

Despite huge population and the existence of both public and private institutions that offers specialized GIS courses in GIS, Nigeria however still has inadequate qualified technical professionals in its geospatial sector. Thus training and education on SDI concepts needs greater attention in Nigeria for an improvement on the shortage of skill GI professionals as well as building of SDI through collaborative approach. While the private sector needs capacity building with regards to how to engage in a “win-win dialogue and advocacy skill”, the public sector counterpart requires capacity building to enlighten government official on the need of PPP as an approach for SDI development in Nigeria.

• ***Governance***

The developed countries such as Australia and the United States of America both have taken cognisance of the recent concept of governance in SDI development that requires the interaction between the public and private sector. As noted by Masser (2005), the above countries have shown a marked shift to “inclusive model of SDI governance and development”. For the case of Australia, ANZLIC has in place an Action Plan that reflects the new governance model that into consideration of the balance between sectors (public and privates), sources of data and users (ANZLIC, 2004).

Not only is the structure of private organizations been different from the public sector (decentralized structure), however the issue of placing public sector as the major stakeholders and private sector as minor in the NSDI project in Nigeria may have adverse effect on its success through PPP approach. The provision of geospatial products and services by both private and public sectors have their advantages through expansion of the geospatial market in Nigeria. Apart from the difficulties associated with combining data and services in such a varying structured organizations and sectors, there is no convincing need to undertake the delivery of the geospatial services individually in Nigeria. Hence, ample opportunities exist for improving partnership between the public and private sector for the sole purpose of SDI development in Nigeria.

• **Good leadership**

The existence of political leadership is critical to the success of the development of SDI through PPP. Good leadership therefore takes into account the potentials of the different sectors in particular the private sector and hence creates a favourable environment for their working together with their counterpart in the public sector. For the development of the

geospatial sectors in Nigeria through PPP, the government is expected to play a leading role by providing a favourable ground for the involvement of the private sector. The government, assuming such political leadership for the case of Nigeria, can assist to reduce misconceptions and doubt that often trail the involvements of private sector in some aspects of public goods or infrastructure like SDI, which the public often considers protected if rendered alone by the public sector.

Policy and Legislation

• *Freedom of Information Act*

Although some level of confidentiality on some information provided by government to the public exists, however in most countries where Freedom of Information Act (FOIA) are implemented no doubt often creates transparency in data sharing and trust by the private sectors to get involved in SDI development. Nigeria is one of the countries where the passage of the freedom of information act is still pending. The passage and implementation of such act by Nigeria will create trust and transparency as an essential requirement for public and private sector collaboration as well as ensures the development of SDI through PPP in the country.

• *Open Access policy*

The presence of adequate access policy, as seen in the reviewed case of the United States of America, typically facilitates information access and enables the private sectors to have access to geospatial information and data at no cost. It is necessary to point out that any user of such information and data often does that on its own risk without holding the data provider reliable for any damage that might emanate. For the purpose of encouraging the use of spatial data in the system the Nigerian government could provide open access to geospatial data to all institutions, irrespective of sector involved, as observed in the case of USA. However a decision could be made of the feasibility of such policy in the future depending on the response from the stakeholders in the course of their implementation. Alternately, in the case of refusal of open access policy in the system, therefore a cost recovery model as seen in the case of South Africa could be implemented with profit making motive sacrificed by the government and hence only the direct costs are to be charged in such case to all data users. Having information policy that guarantees easy access to spatial data at an affordable cost will provide the private sector an opportunity to effectively utilize the available geospatial data as well as create the required support for SDI development in Nigeria through effective partnerships between the public and private sector.

- ***Copyright policy***

The prevailing copyright policy is required to protect and encourage the work of both private and public GI institutions that are directed towards SDI development. Unlike in Nigeria, where works on geospatial data are not totally protected, the situation in the Netherlands is different, since basically all relevant works ranging from the common views made by someone on geospatial information are protected using copyright policy as well as totally enforced by the government.

Although copyright law exists in Nigeria, the enforcement of such laws still remains porous and weak particularly in the “patent and trademark areas”. Strengthening the enforcement of such law would encourage the private sectors to add value by building on the geospatial data available as well as further promote their collaboration with their public counterpart in Nigeria.

Technology Component

- ***World Wide Web Technology***

Developed countries, when compared with developing countries like Nigeria, are more advanced technologically. In response to changing expectation of users, as observed in the reviewed case of Australia in chapter 2, SDI in Australia is advancing towards web service model based on international standard. Web technologies play a critical role in the exchange of data between sectors (private and public) as well as in facilitating easy access to information among relevant stakeholders from time to time. Most institutions in custody of geospatial data, because of the high cost of internet connection and unreliable power system, still adopts the paper format in Nigeria against the web based services (online services) in developed countries like the Netherlands and others. The adoption of similar online data services in Nigeria could facilitate a speedy access to geospatial information provided by both public and private organizations.

- ***Data Standards***

The sharing and use of geospatial data effectively requires an adherence to recognized and acceptable standards. Nigeria as a country does not have any common standard for use in geospatial data sharing unlike the practice in the developed countries and South Africa where international and national standards are respectively adopted for data exchange. The adoption of data standard in Nigeria could facilitate the use of different range of geospatial data as well as hasten their usage for decision making.

5. Proposed PPP Guidelines/Strategies for NSDI Development in Nigeria

5.1 Introduction

In the previous chapters the involvement of private sector in NSDI development in some selected countries as well as the status of geospatial sector in Nigeria has been explored. This chapter however combines the outcome of the previous chapters in this research for an outline of a number of strategic guidelines and requirements to be considered in order to create the required environment favourable for the success of PPP for development of SDI in Nigeria. Some of the recommended guidelines are therefore summarized under the three SDI components such as institutional arrangements, policies and legislations as well as Technology and are meant for future purpose in Nigeria.

Institutional Arrangement

- The government is expected to take a lead in the role of establishing a favourable atmosphere necessary for the operation and collaboration between relevant sectors (public and private sector) and this can accomplish through political support in the sector. The institutional arrangement presently in Nigeria has not clearly defined the roles of many public and private institutions “producing and using geospatial sector”. Conflict of interests still exist in several areas of SDI development and has to be addressed by the government if the NGDI development project in Nigeria can be possible through PPP approach. In this regards, the government’s support is required towards creating opportunities and defining the roles expected of the private sector to play in the geospatial sector of the country.
- Pilot demonstration projects are encouraged to be carried out by the private GI organizations as a means of building awareness of their competence in the geospatial sector in the country. This is likely to draw the attention of the government of their specialized skill and in return can lead to government’s financial commitment and support toward their involvements with the public counterpart in SDI development in Nigeria.
- To create space for better dialogue with the government for the support and involvement of the private sectors like the counterpart public sector, the formation of private sector GI association which considering the limited number of private GI organization in the country might be a better means for winning the required support of the government for their involvement in the geospatial sector and its development.

- To further encourage the use of geospatial information in Nigeria, the promotion and dissemination of SDI concept through talk shows, workshop seminars and conference have to be carried out to create public awareness and enlighten the government officials on the SDI concept and the need for its development through collaboration with the private sector. The research institutions (Universities), on the other hand, can also play an immense role by educating the students about the concept and use of spatial information at the earlier stage of their career. This can in the future create more professionals and citizens that are aware of the importance of SDI as well as the roles played by private sector towards its development in the country.

Policy and legislation

- The establishment of policies and legislations that encourages PPP practice is essential for the cooperation and collaboration of relevant stakeholders (public and private sectors) in the development of SDI. Hence, the existing or formulated policies should therefore facilitate the exchange of data, as well as have effect on collaborative work of the sector.

The Nigerian copyright, in this regards, need to be amended. Furthermore the encouragement and passage of freedom of information Act (FOIA) which will create transparency as an essential requirement for strengthening collaboration between the public and private sector for SDI development in Nigeria.

- From the reviewed cases of countries with pricing policy, FOIA helps to create transparency in the pricing of geospatial product and services among various stakeholders (public or private). Hence, introducing a system of transparent financial practice in Nigeria will eliminate the present events of discriminate pricing of geospatial products among users and will further increase the acquisition/purchase of required geospatial data by other user communities like the private institution at a fair price.

- An appropriate SDI structure where the private sector has the opportunity and freedom to bring out professional proposals in SDI is required and should be created in the geospatial sector in Nigeria. Such opportunity to the private sector to play a role in policy making could result in the establishment of policies that are favourable for the involvement of the private sectors in the development of SDI in the country.

- The establishment of certification procedures required for the partnership of the private sector, with that of the public sectors, is essential in the geospatial sector in Nigeria. This is necessary in order to control the quality of work executed in the delivery of geospatial services by the private sector and in return facilitate the identification of GI private

organizations/sectors for collaborative works and partnership for SDI development by the public sector.

Technologies

- The issue of standards is vital for data sharing and this in the case of Nigeria's geospatial sector has not been addressed. As observed in the case of South Africa (StanSA), the introduction of a legal framework/policy capable of enforcing compliance or implementation of national standards can be an option for addressing the issue of standards in Nigeria. Thus the country could adopt national standards to enhance first the sharing of data among stakeholders (public and private sector) and in the later stage adopt an international standard as the interest in GIS use advances in the country.
- World Wide Web technology is essential for easy access and sharing of information and has in effect had positive impact on SDI development in developed countries such Australia and others. Promotion of the use of internets for data sharing among sectors in Nigeria is to be encouraged. This could be accomplished through reduction of the high cost of internet connection that still hinders easy access and sharing of geospatial data in the country.

5.2 Conclusions

Although a national policy on PPP exist presently in Nigeria, however this approach might not be adopted presently in the country. PPP could be feasible approach in the future for the development of SDI in Nigeria if a proper definition of the roles expected to be played by each sectors (public and private) is clearly established with an enabling law to enforce them. In this case, the passage of the GI policy currently with the parliamentarians for approval might be a way forward at establishing an enabling environment for the success of SDI development in Nigeria through PPP. Also the analysis of Nigeria's geospatial sector as captured in the previous chapters reveal that there are high potential areas in the geospatial setor where the private sector involvements are required to play essential roles. Hence, to create the enabling environment for private sectors to play such roles, it has been recognized that strengthening the SDI development through PPP in Nigeria therefore requires such parameters like government support, FOIA that links to transparency in the system as well as the existence of geospatial data policies (Copyright). It is paramount to point out at this juncture that the involvement of private secrors in SDI development in Nigeria is considered to be mere private sector participation rather than collaboration, since they are seen and involved in the process of SDI development typically as user community or partners only.

6. Conclusions and Recommendations

6.1 Introduction

This chapter provides conclusion of this research starting with the discussion of the research questions, limitations encountered in the study and future research recommendations for the involvement of private sectors in SDI development in developing countries, in particular Nigeria.

6.2 Conclusions

Developing strategies towards the utilization of PPP with particular focus on the private sector involvement in the development of SDI in Nigeria is the principal objective of this research. To accomplish this objective three basic research questions and answers have been addressed in previous chapters and are reviewed in this chapter below as summary.

Research Question 1: *What role(s) does private sector play in institutional arrangements, policies and technological issues from both developed and developing that can be considered for PPP approach in SDI development in Nigeria?*

From the discussions in chapter 2 and analysis of the geospatial sector in Nigeria in chapter 3 in this respect, the following findings below were discovered:

- In order for public private partnership to become known in both developed and developing countries, it is noticeable that private sector had contributive role which are of consideration to be played under institutional arrangements, policies and technology issues for successful SDI development. With regards to institutional arrangement, the private sector played several roles that ranges from education and trainings for GI professionals, to the provision of financial supports for SDI development. In most countries however, the provision of financial support by the private sectors are limited due to the believe by most citizens and in several public quarters, that SDI is a public asset and hence their development and funding are better done by the government (public sectors). Moreover from the dimensions of policies and legislations, the private sector roles in influencing government policies towards supporting public-private collaborations also contributed in SDI development in many of the reviewed country's cases of the research. The private sectors roles as identified from the selected case studies can be applied in Nigeria for its SDI development.
- The collaboration between the public and private sector has notable success in SDI development projects in most developed countries. This is justifiable in the successful

experience of the GBKN project in the Netherlands and other reviewed cases of countries where proper sharing of financial support and roles between sectors are clearly defined and as a result facilitates an easy management and success of SDI development through PPP.

Research Question 2: *What are the opportunities, Challenges and threats for the development of SDI through PPP in Nigeria?*

- **Opportunities:** The opportunities and prospects of PPP as an approach for public service delivery in Nigeria lies firstly on its success in other sectors of the economy where it has been applied as well as the existence of PPP policy in the country. Also the growing awareness of GIS in Nigeria coupled with the rise in the number of GI private organizations playing several roles in the geospatial sector are major opportunities for the development of SDI through PPP in the country. With the growth in GIS awareness however several private GI professionals are using such as an opportunity to establish today their own GI organizations and hence the number of institutions in possession of geospatial data and GIS software in Nigeria is increasing.

- **Challenges and threats:** Although the GI policy statement for NGDI development in Nigeria is impressive in terms of their stipulation for the involvement of private sectors, however the implementation is still confronted with several challenges as noted in the comments made by respondents to the research questionnaires. First the absence of clear SDI directive in the geospatial sector due to none passage into law of the GI policy as it is at present, is a major threat in general for the development of SDI through PPP in Nigeria. This situation has made it hard for NASRDA (SDI coordinating agency in Nigeria) to implement standards for geospatial data acquisition and distribution in the country. Thus geospatial data acquisitions are still progressing individually among various data producers sectors with consequent effect on geospatial data being duplicated. In the same manner, data sharing between sectors are still lacking or limited in most cases if not totally prohibited. Nigeria is a country characterized with diverse geographic, cultural and social features and, as a result, each section has specific data requirements and consequently has difficulties in sharing them with others without some benefit. Hence, SDI directive through existence of applicable GI policy in the system can minimize if not eliminate such individualistic tendencies towards data acquisition and sharing.

Second, although been a merit to SDI development that most of the GIS projects undertaken by both the private and public sectors are donor funded, however, the absence of the required coordination among those projects in both sectors (public and private) is a serious threat that could hamper the development of SDI through PPP. This is likely to worsen the duplication of data which is already an ongoing problem in the geospatial sector of the country.

Third, lack of awareness on existing specific datasets and political interference are another existing challenge in the geospatial sector in Nigeria. Contrary to the expectation of many relevant stakeholders in the country's geospatial sector, it is regrettably that the government still engaged in the "practice of patronage and favouritism over capability and competence" in the selection process of GI partner for SDI development. This situation in the past has led to the government selecting and imposing Private GI companies which might not have the required skill as partners and instead of advancing the involvement of private sector however retards their collaboration in SDI development in the country.

Research Question 3: *Which requirements or parameter are essential for Nigeria for its SDI development through PPP?*

The requirements for PPP implementation across countries to a large extent are dependent on the type and associated nature of project. The reviews of the geospatial sector in Nigeria as well as the experiences of some selected countries in SDI development through PPP indicates that PPP can transpire as an approach for the development of SDI in Nigeria with the following requirements below in place:

- To ensure that PPP transpires in Nigeria, it is necessary that SDI should be taken as one of the critical priority projects and hence requires political support of the government as an essential requirement. This therefore entails enlightening various public officers of the government including the parliamentarians on issues relating to the roles that the private sector could play in facilitating geospatial data sharing as well as in the development of SDI in the country in general. Moreover, as part of the technological requirements, open standards, which in terms of licensing cost is free, has to be encouraged in order to ensure that geospatial data is created, managed and distributed in an "open, inclusive and more transparent way" to all to required users.
- The establishment of legislations and policies such as intellectual property and copyright laws, privacy, data pricing and freedom of information (FOIA) policies that are

capable of stimulating and creating environments favourable for data exchange as well as encouraging collaborative work between the public and private sectors are also requirements for the success of SDI development through PPP in Nigeria.

- Common goals and understandings, trust, communication as well as negotiation are another side of the requirements which are vital for reaching agreement on parallel issues that has to do with SDI development through PPP. There should be a common aspiration and drive among parties (public and private) that will propel total contributions of both parties in SDI development. Because the development of SDI in most developing countries are at their young stage, however, commitments and trust by both the public and private sectors are essential requirement for long term security and success of SDI development in Nigeria through PPP.

6.3 Limitation of the Study

In the course of this research several limitations were encountered. The questionnaire administration period took place within December, 2010 and unfortunately coincides with the time when a national strike was on-going in the study region. This situation limited the number of questionnaires that were returned as well as the ability of the researcher to reach some of the expected respondents. Although some respondents were not reached nor did they respond to the questionnaire, however this number did not in any way affect the result of the research since attempts were made through telephone follow-up that resulted in a reasonable number returned.

Moreover another limitation has to do with the selected case study countries which were grouped into two classes (developed and developing countries) according to the 2010 United Nations human development index. However the individual countries in each group were arbitrary selected based on data availability. There are several countries that fall within each of the groups which still adopts PPP as an approach to SDI development and in various SDI initiatives in their respective countries but was not part of the case study countries due to availability of data.

6.4 Recommendations

The recommendations covered in this section have been classified into two folds viz: the strategic and operational recommendations as well as further research issues that needs to be investigated in the future in order to make the research more useful.

6.4.1 Strategic and operational recommendations

Considering the current situation of the geospatial sector in Nigeria, it is clear that PPP could be a viable option for its development. In this regard, some strategic and operational recommendations have been suggested for the successful development of the sector and private sector involvement:

- Some demonstrational SDI projects with outline of goals and targets to achieve should be created for the private organizations to expose their capability and this could be done in collaboration and alignment with the public sectors counterpart to enable transfer of skills required for SDI development.
- Formal authorization of private sectors for formations of association is needed in order to facilitate dialogue with the government (or public sector) as well as for common vision and goal in SDI development.
- The development of SDI in Nigeria could begin and progress on public service sector basis. In this regard, the telecommunication sector might be a better starting sector since an appropriate PPP framework exist already in the sector. Hence taking off with the above sector could make it easier to demonstrate the value of PPP as well as the promotion of private sector involvement in other sectors.
- Furthermore, the development of SDI in Nigeria at present will require the encouragement and employment of qualified professionals as well as the development of data standards which could be local or open standard.

6.4.2 Recommendation for Future Research

According to Michael Wegener “Everything that happens, happens somewhere in space and time”. Hence within the limited “time and space” however, this research therefore focused on investigating the potentials of PPP as approach to SDI development within some specific domain. It highlights the roles of private sectors as well as the requirements, potentials and added values of public private partnerships as an approach to SDI development from institutional arrangements, policy and technology aspects. The research from the above domain is therefore a continuous process. Base on this fact, the following suggestions are recommended for further research:

- Since this research places emphasis only on three SDI components such as Institutional arrangement, policies and technology issues, however it might be necessary in future research to investigate the potential of PPP in relation to SDI development in

other components like data and people as well as focusing on cultural aspects and its influence on SDI development through PPP.

- As one of the limitations of this study, the selected case study countries for this research were selected arbitrarily based on data availability. There are still several countries which according to 2010 United Nations human development index are also classified as developed and developing countries as well as adopts PPP as an approach for their SDI development. These countries were excluded from the selected case due to data available during the time of this research. In order to further increase the usefulness of this research, however, it is recommended that these countries should be included as selected case study countries for this study in the future.

Bibliographic References

- Adadie, R., and Howcroft. A., (2004). Developing Public Private Partnership in New Europe. <http://download.pwc.com/ie/pubs/Deveoping_Public_Private_Partnerships_in_Europe.pdf> Accessed: September, 2010.
- Adeoye, A., and Ojesanmi, O., (2001). Development of National Databank: National Planning Commission, Case Studies being Paper Presented at the Nigeria Institute of Surveyors Annual General meeting, Lagos, 2001.
- African Economic Research Consortium, (AERC, 2002). Public Enterprise Reform in Nigeria: Evidence from telecommunications industry. AERC Research paper, Nairobi, March, 2002.
- ANSI, Government Affair (2005). A strong Private Public Partnership. Available: <www.ansi.org/government_affairs/partnership.aspx?menuid=6>. Accessed: August, 2010.
- Abuja Water Board, (AWB, 2009). Expanded National demand study for Water Access AWB Publication, 2009.
- ANZLIC (1996), *Spatial data infrastructure for Australia and New Zealand*, Available: <<http://www.anzlic.org.au/asdi/anzdiscu.htm>> Accessed: November, 2010
- ANZLIC, (1999), Policy Statement on Spatial Data Management: Towards the Australian Spatial Data Infrastructure. Available: <www.anzlic.org.au/pubinfo/2358011750.html> Accessed: 1st September, 2010,
- ANZLIC (2003). ASDI Distributed Network; The Internet Framework Technical Architecture, pp.23. Available: <www.anzlic.org.au/ASDI_quick.html>. Accessed: September, 2010.
- ANZLIC (2004). ANZLIC Postion Paper: Engagement with the Spatial information industry. Available: <<http://www.anzlic.org.au/pubinfo/2393322741.html>> Accessed: Septmber, 2010.
- ANZLIC (1996), *Spatial data infrastructure for Australia and New Zealand*, Available: <<http://www.anzlic.org.au/asdi/anzdiscu.htm>> Accessed: November, 2010.
- Agbaje, G. I. (2006). Nigerian National Geospatial Data Infrastructure Programme: Concept, Implementation Strategies, and Progress up-date, NASRDA and Infoterra-UK: 12.

- Akinyemi, F. O. (2007). Spatial Data Needed for Poverty Management. *Research and Theory in Advancing Spatial Data Infrastructure Concepts*. H. Onsurd. California,ESRI: 261- 277.
- Akinyede, J.O.(2004). Geoinformation Acquisition for National Development. *The Role of NigeriaSat-1. NASRDA News, A quarterly Magazine of National Space Research and Development Agency, 1(1), pp.6-7 and 21.*
- Banisar, D., (2001). Freedom of Information and Access to Government to Government Record Laws Around the World. Available: <www.privacyinternational.org/issues/foia/FOI_survey3.01.pdf>. Accessed: 2nd September, 2010.
- Bailey, A and Johnson, G. (1996). *Patterns of Strategy Development*. Center for Strategic management and organizational change, Cranfield University, United Kingdom.
- Baraka, M.A., (2005). Geoinformatics e-learning in Egypt. Fig Working week and GSDI-8 <www.fig.net/pub/cairo/papers/wsva_02/wsva02_01_baraka.pdf>. Accessed: 1st October, 2010.
- Busby, J.R., and Kelly, P., (2004b). Australian Spatial Data Infrastructures, GSDI India, PP.10.
- Bennet, R.J. and Krebs, G., (1994). Local Economic Development Partnerships: An analysis of Policy Networks in EC-LEDA Local Employment Development Strategies, *Regional Studies*, No. 28, pp.119-40.
- Bovaird, T., (1986). Public and Private Partnerships for Financing Urban Programme, in E. A. Rose (ed.) *New Roles for Old Cities*, Gower Press: Aldershot.
- Bovaird, T., (2004). Public Private Partnerships: from Contested Concepts to Prevalent Practice, *International Review of Administrative Sciences* 2004; Vol.70, No 2, pp. 199 - 214.
- Brinkerhoff, D.W. and Brinkerhoff, J.M., (2004). Partnerships between International Donors and Non-Government Development Organizations: Opportunities and Constrains, *International Review of Administrative Sciences*, Vol.70, No. 2, pp. 253-270.
- Broadbent, J. and Laughlin, R. (2004). Public Private Partnerships: nature, development and unanswered questions. *Australian Accounting Review*, 14(2):4-10.

- Camp, R.C. (1935). Benchmarking: The search for industry best practices that lead to senior performance.
- Canada's Business and Consumer Site (2004). Choosing the Best P3 Model. Available: <http://strategies.ic.gc.ca/epic/internet/inpupr-bdpr.nsf/en/h_qz0158e.html#which>. Accessed: November, 2010.
- Cooper, A., (2004a). Status of the Standardization of Geographical Information in Africa
Coleman D.J. (1999). "Collaborative Approaches to building a Canadian Geospatial Data Infrastructure." *Proceedings of the 1999 Cambridge Conference*, Cambridge, UK, July 19-24.
- Cooper, J., and Coleman, D.J., (2004b). Examining the Roles of Partnerships in Building a Canadian Geospatial Data Infrastructure. UN, FIG.PC IDEA:12. Available: <www.fig.net/pub/mexico/papers_eng/ts3_coleman_eng.pdf>. Accessed: 30th September, 2010.
- Craglia, M., and Johnston, A., (2004). Assessing the Impacts of Spatial Data Infrastructures: Methods and Gaps: 7th AGILE Conference on Geographic Information Science.
- Creuzer, P.(2002). Land Administration in Public Private Partnerships. Available: <www.eurocadastre.org/pdf/creuzer2.pdf>. Accessed: 3rd November, 2010.
- Crompvoets, J., and Bregt, A., (2003). World Status of National Spatial Data Clearinghouses. URISA, 15.
- Collin, S., and Hansson, L., (2000). The Propensity, Persistence and Performance of Public-Private Partnerships in Sweden, in Osborne, S.P., (ed.) *Public-Private Partnerships: Theory and Practice in International Perspective*, London: Routledge, pp. 201-219.
- Di, L., (2004). Distributed Geospatial Information Services-Architectures, Standards, and Research Issues. Available: <www.isprs.org/proceedings/XXXV/congress/comm2/papers/121.pdf>. Accessed: 30th August, 2010.
- Douglas, N. (1997). The US National Spatial Data Infrastructure: An Overview <http://buccaneer.geo.orst.edu/myst/nsdi_ppt/sld001.htm>
- Eekelen, H.V., (2001). A Map that took 25 years to complete Large Scale Base-map As Authentic Registration. Available: <www.gbkn.nl/nieuweweb/downloads/Gimdef.pdf> Accessed: 29th October, 2010 .

- Federal Geographic Data Committee (FGDC, 1997). A Strategy for the NSDI. Available: <www.fgdc.gov/nsdi/policyandplanning/nsdi-strategic-plans>. Accessed: 13th October, 2010.
- FGDC (1994). The 1994 Plan for the National Spatial Data Infrastructure: Building the Foundations of an Information Based Society. Available: <www.fgdc.gov/policyandplanning/NSDI%20Strategy%201994.pdf>. Accessed: 4th October, 2010.
- Fornefeld, M., Oefinger, P., and Rausch, U. (2003). The Market for Geospatial Information: Potentials for Employment, Innovation and Value Added. MICUS Management Consulting GmbH. <www.micus.de>
- Feeney, F. M. E., Rajabifard, A., and Williamson, I. P. (2001), “Spatial Data Infrastructure Frameworks to Support Decision-Making for Sustainable Development”, *Proceedings of 5th Global Spatial Data Infrastructure Conference*, 21-25 May 2001, Cartagena de Indias, Columbia, p. 14.
- Geography Advisory Group (GAG, 2004). A Geographic Information Strategy for England.
- Gumos, A.K. (2005). Modelling the cross-country trafficability with Geographical Information Systems. Department of Computer and Information Science, Linköping University, linköping, Sweden.
- Gidman, P., Blore, L., Lorentzen, J., and Schuttenbelt, P., (1995). Public-Private Partnerships in Urban Infrastructure Services.
- Giff, G., and Coleman, D.D., (2002). Spatial Data Infrastructure Funding Models: A necessity for the success of SDIs in Emerging Countries. FIG XXII International Congress: 16. Available: <www.fig.net/pub/fig_2002/Ts3-4/TS3_4_giff_coleman.pdf>. Accessed: November, 2010.
- Groot, R., and McLaughlin, J., (2000). Geospatial Data Infrastructure, Concepts, Cases and Good practice. Oxford: Oxford University Press.
- Gavin, E., and Gyamfi-Aidoo, J., (2004) Environmental Information Systems development in Sub-Saharan Africa. Fundamental Datasets for Africa Framework data sets for the NSDI. EIS-Africa, Pretoria.
- Gupta, R., *GIS@development*, July–August 1999, vol. 3.4, pp. 42–45.

- Haggag, A., Shaker, I., El-Maghraby, M., and Zobarei, A. (2005). Towards an Automated Information System for Cadastral Survey in Egypt. FIG Working week and GDSI-18 Available: <http://www.fig.net/pub/cairo/papers/ts_34/ts34_04_haggag_etal.pdf>. Accessed: 29th September, 2010.
- Hussein, M.S., (2005). The Role of Egyptian Survey Authority in Building Spatial Data Infrastructure (ESDI) Towards the Electronic Government (E-gov). FIG Working week and GSDI-8:15. <http://www.fig.net/pub/cairo/papers/ts_02/ts02_04_hussein.pdf>. Accessed: 5th November, 2010.
- Igbokwe, J. I. and M. N. Ono (2005). *Nigeria's National Geo-Spatial Data Infrastructure: Prolems and Prospects*. From Pharaohs to Geoinformatics, Egypt, FIG.
- Jacoby, S., *et al.*, (2001). Victoria's SDI initiatives: Fundamental partnerships driving the development of spatial data infrastructure, *Proceedings of International Symposium on Spatial Data Infrastructure*, 19-20 November 2001, Melbourne, Australia.
- Kok, B., and Loenen, B.V, (2004). How to assess the sucess of National Spatial Data Infrastructure. ELSEVIER.
- Kok, B., and Loenen, B.V, (2001). Policy Issues Affecting Spatial Data Infrastructure Developments in the Netherlands. Available: <www.spatial.maine.edu/~onsrud/gsd/Netherlands.pdf>. Accessed: 23rd October, 2010.
- Kufoniyi, O. and G. I. Agbaje (2005). National Geospatial Data Infrastructure Development in Nigeria: The Journey So Far. From Pharaohs to Geoinformatics FIG Working Week 2005 and GSDI-8. Cairo, Egypt, FIG: 12.
- Kumar, R. (2006). *Research Methodology: A Step-by-Step Guide for Beginners*. Second Edition.
- Kufoniyi, O. (2002). Cadastral Database, An Essential Component of the Fundamental Datasets of A National Geospatial Data Infrastructure. *Proceedings of the Technical Session of 37th Annual Conference of Nigeria Institution of Surveyors*, Owerri, Nigeria, pp. 19-24.
- Klijn, E.H. and Teisman, G.R., (2005). Public-Private partnerships as the management of coproduct: strategic and institutional obstacles in a difficult marriage in *The Challenges of Public Private Partnerships- Learning from International Experience*, Edited by Hodge, G. and Greve, C., Edward Elgar Publishing limited: UK.

- Lemmen, C., Radwan, M., Kader, F.a, and Abdelmoneam, A. (2005). A vision on the Development of the Urban Cadastre in Egypt. FIG Working week and GSDI-8:15. Available: <www.fig.net/pub/cairo/papers/ts_37/ts37_01_lemmen_etal.pdf>. Accessed: 27th September, 2010.
- Murre, M. L.(2005). GBKN-the Large Scale Basemap of the Netherlands, Amersfoort.
- Masser, I., Williamson, I., Rajabifard, A (2008). Spatially enabling governments through SDI implementation. *In International Journal of Geoinformation Science, Vol. 22, Issue1, pp5-20.* Available: <www.informaworld.com/smpp/content~content=a780499598>. Accessed: September, 2010.
- Molen, P.v.d., (2002). Partnerships for better services: public-private and public-public partnerships to achieve better service to customers in the Netherlands.
- Moshiro, S. (2008). Licensing in the era of Liberalization and Convergence. The Case study of Federal Republic of Nigeria. NCC, publication, 2008.
- Nichols, S. and D. Coleman and K. Salam (1999). “Developing a Conceptual Framework Architecture to support the Canadian Geospatial Data Infrastructure” Contract Report prepared for the Canadian Geospatial Data Infrastructure Secretariat, Geomatics Canada, Ottawa, Ontario, Canada.
- Nigerian Economic Summit Group (NESG,2009). *Nigerian Economic Summit Report.* Spectrum Books Limited. Lagos, Nigeria.
- Nelson, J. (2002). *Building partnerships: Cooperation between the United Nations system and the private sector.* Report commissioned by the United Nations Global Compact. New York: United Nations Department of Public Information.
- Nebert, D. D. (Ed.) (2004). Developing Spatial Data Infrastructures: The SDI Cookbook, version 2.0, Available: <www.gsdi.org/docs2004/Cookbook/cookbookV2.0.pdf> Accessed: 30th September, 2010.
- NASRDA (2003a). Draft Geoinformation Policy for Nigeria. National Space Research and Development Agency (NASRDA), Federal Ministry of Science and Technology. Available: <www.rectas.org/NigeriaGIPolicy.htm>. Accessed: 1st December, 2010.

- Onsrud, J. H., and Lopez R. X (1998). Intellectual property rights in disseminating digital geographic data, products, and services: Conflicts and Commonalities among European Union and United States approaches.
- Onah, C.C. (2009). Spatial Data Infrastructures Model for Developing Countries: A Case study of Nigeria. Erasmus Mundus Master's Degree Thesis in Geospatial Technologies, Universidade Nova de Lisboa, Portugal, Universitat Jaume, Spain and University of Munster, Germany.
- OMB (1990). Coordinating the surveying, mapping and related spatial data activities, Circular A-16 revised (Washington D.C. Office of Management and Budget, Executive Office of the President).
- Radwan, M.M., Nasr, M.H., Eisayegh, A., Frekry, S., and Kassem, A. (2005). New Directions in the Egyptian Survey Authority and Impact on the Requirements for Capacity Building: An Example of International Cooperation for Human Resource Development. FIG Working week 2005 and GSDI-8:15.
- Radwan, M., Nasr, M.H., Lemmen, C., and Hussein, S., (2005). The Egyptian Survey Authority Business Model to Strengthen Public Private Partnership in the real estate industry. FIG Working week 2005 and GSDI-8:15.
- Radwan, M.M., Bishr, Y., Emara, B., Saleh, A. And Sabrah, R., (2005). Online Cadastre Portal Services in the Framework of e-government to Support Real State Industry in Egypt. FIG Working week 2005 and GSDI-8:16. Accessed: 7th November, 2010.
<http://www.fig.net/pub/cairo/papers/ts_02/ts02_03_radwan_etal.pdf>
- Rajabifard, A., and Williamson I., (2005). Spatial Data Infrastructures: An initiative to facilitate spatial data sharing.
- Rajabifard, A., Feeney, M.-E.F., Williamson, I., Masser, I., (2003a). National spatial data infrastructures. *In Developing spatial data infrastructures: From concept to reality*. Edited by I. Williamson, A. Rajabifard, M.-E.F. Feeney. London: Taylor and Francis, pp.17-40.
- Rajabifard, A.. et al., 2003b SDI Diffusion. *In Developing spatial data infrastructures: From concept to reality*. edited by I. Williamson, A. Rajabifard, M. E. Feeney. London: Taylor and Francis, pp.79-94.

- Riley, J.M. and Riley, G.B, (2004). Strategy – SWOT Analysis. Tutor2u Limited, 19 Westwood way, Boston Spa, WETHERBY, LS23 6DX.
- Tosta, N., (1999). Building National Spatial Data Infrastructures: Roles and Responsibilities <<http://www.gisqatar.org.qa/conf97/links/g1.html>>
- The National Council for Public Private Partnerships (1999). Public-Private Partnership
- Stern, S. and Harding, D., (2002). Profits and Perils of Public Private Partnerships, Euromoney, 394, 126, in *The Challenges of Public Private Partnerships- Learning from International Experience*, Edited by Hodge, G and Greve, C., (2005), pp. 95-116, Edward Elgar Publishing limited: UK.
- UN (2003b). Enhanced cooperation between the United Nations and all relevant partners, in particular the private sector, *Report of the Secretary-General to the General Assembly. Item 47 of the provisional agenda: Towards global partnerships*. Un Doc. A/58/227. New York, 18 August, 2003.
- United Nations Economic and Social Council (UNESCO, 2000). Workshop on public/private sector relationships in the establishment of Land Registration.
- Warnet, M., Rajabifard, A., and Williamson, I. (2001). Understanding inter-organizational collaboration and partnerships in the development of National SDI. URISA. Available: <www.undp.org/cu/eventos/espacial/URISApaper_Warnet.pdf>. Accessed: 10th November, 2010.
- Warnet, M., Rajabifard, A., and Williamson, I. (2005). A Collaborative Approach to Building National SDI in Federated State Systems: Case study of Australia, From Pharaohs to Geoinformatics. FIG Working Week, 2005 and GSDI-8, Cairo, Egypt, pp.11. Available: <http://www.fig.net/pub/cairo/papers/ts_12/ts12_01_warnet_etal.pdf>. Accessed: 18th November, 2010.
- Williamson, I., Rajabifard, A., and Feeney, M. F.,(2004). Developing spatial data infrastructures From concept to reality. Available: <http://www.anzlic.org.au/asdi-l/att0045/03-SDI_book_order_form_1.pdf>. Accessed: 21st November, 2010
- Williamson, I., Rajabifard, A., and Feeney, M. F.,(2001). Land Administration and Spatial Data infrastructure: Trends and Developments.

- Williamson, I., Kevin, M., Rajabifard, A (2005). Understanding the Motivations and capacity for SDI Development from the Local Level.
- Walzer, N. & Jacobs, B. D. (1998), 'Introduction and overview', in *Public-private partnerships for local economic development*, eds. Walzer, N. & Jacobs, B. D., Praeger Publishers, Westport, pp. 1-18.
- Webb, R. and Paul, B., (2002). *Public Private Partnership: An Introduction*, Parliament of Australia: Canberra.
- Youssef, A., (2005). The Strategies of Land Information Management System. FIG Working Week and GSDI-8:16.
- Yin, R. K. (1994), *Case study research: Design and methods*, Applied Social Research Methods Series, Second edn, Sage Publications Inc, Thousand Oaks.

Appendices:

Questionnaire

Public Private Collaboration: Potential for Strengthening Spatial Data Infrastructure (SDI) in Developing Countries: A case study of Nigeria.

M.Sc. Thesis in Geospatial Technologies

Questionnaire Survey

By

Chima Ogbonnaya Nkwor.

Introduction

This survey aims at developing strategies towards the use of public private partnership (PPP) to support National Spatial Data Infrastructure (NSDI) in Nigeria with focus on private sector involvement in three SDI components. Questionnaire survey is adopted as the main approach in this survey.

This questionnaire will be distributed to the staff and committee members of the National Space Research and Development Agency (NARSDA) and the Infrastructure Concession Regulatory Commission (ICRC) which is the coordinating agencies of NSDI and PPP respectively in Nigeria. Others are the PPP foundation of Nigeria, Abuja Geographic Information Agency (AGIS), Office of the Surveyor General of the Federation (OSGF) and some selected organized private sectors in Nigeria.

Instruction and Organization

The first part of the questionnaire is for personal details of the respondents. This is followed by the close end multi-choice questionnaire designed to address the target objectives of the research. Please, tick (X) from the options or use a free text comment where necessary to answer the questions.

Section A: Personal Details:

| | |
|--------------------------------|--|
| Name of organization | |
| Type of organization | |
| Name of person completing form | |
| Position | |
| Email Address | |
| Phone Number | |
| Website | |

Section B: Organizational Background and Services

1. At what level does your organization's function or operate?

- Local
- National
- International
- Others (please indicate)

2. What is the major Geospatial service/activity of your organization?

- Utility (Water, electricity, telephone)
- Land Surveying
- GI Data Collection, Processing and analysis
- Map Production (Topographic, Thematic etc)
- GI Training/education
- Other (please indicate)

3. In what way is your service made accessible to your customers?

- Web/internet based services
- Telephone
- Office visit
- Others (please indicate)

4. Which are major datasets often used by your organization?

- Cadastral information
- Hydrology
- Administrative units
- Utility location (water points, electricity lines)
- Others (please indicate)

5. How does your organization get access to required dataset (Question 4)?

- Purchase from data custodians
- Open to all users (government and other sectors)
- Other (please indicate)

6. In the course of geospatial services delivery, what is the major challenge(s) confronted by your organization?

- Lack of data

- Existence of policies prohibiting sharing
- Absence of communication access networks
- Absence of common standards
- Cost of data acquisition and/or conversion
- Issues related to data pricing
- Other (please indicate).....

C) Public Private Partnership (In General)

Definition of Public Private Partnerships (PPP)

In the context of this research, Public Private Partnership (PPP) connotes “collaborative relationships between the public and private sector agencies, in which both parties under a contract agreement accepts to work together to achieve a common purpose or undertake a specific task and to share risks, responsibilities, resources, competencies and benefits” (UN 2003b, Nelson, 2002).

Please tick (X) before proceeding to the rest of the questions the category into which your organization fall below

- Public Sector Private Sector Research/Academia

7. Have you or your organization engaged in any form of partnerships or collaboration in the course of any public service delivery?

- Yes No

Briefly explain

.....

8. Please tick behind any of the public service(s) that is/are being delivered in partnership of your organization with another sector (public or private)?

- Water
- Health
- Education
- Electricity
- Transportation
- Other (please indicate).....

Please mention the partner organization below

9. Which of the expectations is/are your organization likely to derive from the use of PPP?

- Improved service delivery
- Improved efficiency
- Better informed decision making
- Better partnership working
- Healthier business environment
- Enhanced conditions for economic growth
- Other (please specify)

10. What reasons surround the success of the partnership arrangement of your organization and partner sector in the delivering of public services?

- Availability of finance
- Good leadership/administration
- Good working environment and related policies
- Quality of the available services
- Good communication and trust
- Other (please indicate)

11. Is there any coordinating body to facilitate the preparation and development of public infrastructure projects through PPP within your country?

- Yes No

If yes, please the function (s)?

.....

If you answered **No**, are there any plans for establishing such a coordinating unit by your country or government?

.....

12. Is there any policy guideline established to direct PPP operations in your organization or country? Yes No

If Yes, indicate such policy (Please)

13. Which of the following pattern of collaboration and funding is used by your organization for the public services delivery indicated in question 8 through PPP?

- Joint Public/private funding and joint public/ private sector in-charge of management and service delivery
- Public funding and private sector in-charge of management and service delivery
- Joint Public/private funding and joint management as well as delivery of service
- Private funding and private management as well as service delivery
- Other (please indicate)

D) PPP for National Spatial data Infrastructure Development

i) Institutional Arrangement

14. Does your organization have any experience in the use of PPP as an approach to geospatial services delivery?

- Yes No

If Yes, please mention (if any) the approach in use for such.....

15. What role does your organization play in SDI development initiatives?

Briefly explain

.....

16. Does such a PPP coordinating body referred to in question 11 above also responsible for SDI development and its other related initiatives in your country?

If “No”, please indicate the custodian body and if possible their role in SDI development

.....

17. In your opinion do you think that opportunities exist in Nigeria for the use of PPP for SDI development?

- Yes No

If yes, explain

.....

If **No**, explain.....

18. Where in your opinion do you think that closer cooperation between the public and private sectors could help or is important for SDI development in Nigeria?

.....

19. In your view, how do you think that closer cooperation between the public and private sector could be established for SDI development in Nigeria in the areas referred to in question 18 above or any other SDI related areas?

.....
.....

20. What do you think in your opinion or experiences are the threats or challenges that if possible should be avoided for the strengthening or development of SDI through PPP in Nigeria?

.....
.....

ii) Policy and Legislation Issue

21. If your respond to question 12 above is “Yes”, does such policy apply to SDI development through PPP in your country or organization?

Yes No

22. Does any of the following policies exist for Geospatial services delivery in your organization?

(1) Pricing Policy Yes No

If yes, in what way is it enforced?

Price list
 Other (please indicate)

(2) Copyright Policy Yes No

If yes, in what way is it enforced?

Follow-up of copyright infringement
 Other (please indicate)

Please provide further comment that you might have in the space provided below.

**Please return the questionnaire as attachment to nkwornna@yahoo.com
Thank you for your kind cooperation**