



GHANA INFRASTRUCTURE PLAN

2018-2047

VOLUME TWO



NATIONAL DEVELOPMENT PLANNING COMMISSION

OCTOBER 2025

(Final Draft)

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FOREWORD

In 2015, the National Development Planning Commission began the process of producing the Ghana Infrastructure Plan (GIP) to support the implementation of Ghana's long-term national development plan, popularly known as the 40-Year Development Plan (2018-2057). The GIP was substantially completed by 2016 and was ready for further reviews and implementation by 2018, its start date, ending in 2047, for a total of 30 years, the average lifespan for many major infrastructure projects. In 2019, however, the GIP was revised but the process stalled afterwards. The 40-Year Development Plan, which was to span 2018 to 2057, suffered a similar fate as the government developed competing frameworks to the 40-Year Development Plan.

Following the 2024 election, and during the inauguration in May 2025 of the Commission by the President, H. E. John Mahama, he urged the Commission to compile all the previous efforts into a composite long-term national development plan, based on the various experiences learnt since 2016, to meet the demands of the public. The GIP represents the first instalment – the foundation – of what we expect be the final long-term plan for Ghana, with the legislative blessing of the people's representatives, Parliament.

Much has happened since the revision, but the essential elements of the GIP remain the same, with each of its nine “frameworks” subjected to continuous revisions to keep up with latest developments. By publishing it in its current state, we seek to show Ghanaians what was done in their name as part of the arduous search for development. It should also help enrich public discourse about infrastructure delivery and elicit feedback from the public for the operationalisation of the plan through medium-term and annual action plans.

As the physical counterpart of the sectoral long-term development plan, which should be completed in time to guide the preparation of political party manifestos, the GIP will play a critical role in restoring Ghana's role as a pioneer in economic development by 2057, the 100th anniversary of its independence.

The Ghana Infrastructure Plan comprises the following:

1. Energy Infrastructure
2. Transport Infrastructure
3. Water Infrastructure
4. Human Settlements and Housing
5. Social, Civic and Commercial Infrastructure
6. ICT Infrastructure
7. Institutional Development
8. Results Framework
9. Financing Framework

Dr. Nii Moi Thompson
Chairman

ACKNOWLEDGEMENTS

As a long-term document, the Ghana Infrastructure Plan (GIP) is a framework, or a master plan, for the preparation of medium-term and annual infrastructure plans by successive governments up to 2047, 10 years before the completion of its “mother” document, the *40-Year National Development Plan*. It was prepared with the support of many individuals and institutions. The vision and commitment of both the previous and current leadership of the Commission, particularly chairmen P.V. Obeng, Prof. Kwesi Botchwey, Prof. Stephen Adei, Prof. George Gyan-Baffour, and Dr. Nii Moi Thompson, proved highly valuable from the start to the completion of the GIP.

We wish to express our profound gratitude to the members of the Commission, especially the Energy as well as Infrastructure, Spatial Planning and Human Settlements thematic committees, who rigorously reviewed the plan and provided insightful comments for its preparation and finalisation.

We also acknowledge the team of specialists made up of government experts and consultants, led by Ing. Charles K. Boakye, who brought their vast experience to the preparation of the plan. Special appreciation goes to the Ministries, Departments and Agencies (MDAs) for providing the necessary data for the Plan and participating at every stage in its preparation and completion.

Last but not least, the staff of the Commission deserve special commendation for burning the proverbial midnight oil to ensure that the contents of the plan conformed to the development aspirations of Ghanaians as outlined in the 40-Year National Development Plan, officially known as “Ghana Rising: Long-term National Development Plan of Ghana (2018-2057).

Dr. Audrey Smock Amoah
Ag. Director-General

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LIST OF ACRONYMS AND ABBREVIATIONS

ABCECG	Association of Building and Civil Engineering Contractors of Ghana
AfDB	African Development Bank
AFOLU	Agriculture, Forestry and Other Local Uses
AGI	Association of Ghana Industries
BECE	Basic Education Certificate Examination
BIM	Building Information Modelling
BOQs	Bill of Quantities
CIDA	Construction Industry Development Authority
CIDB	Construction Industry Development Board
COP	Conference of Parties
COTVET	Centre for Technical, Vocational Education and Training
CPD	Continuing Professional Development
CSM	Cerebral Spinal Meningitis
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
GDP	Gross Domestic Product
GER	Gross Enrolment Rate
GhIE	Ghana Institution of Engineers
GIA	Ghana Institution of Architects
GIIF	Ghana Infrastructure Investment Fund
GIP	Ghana Infrastructure Plan
GIS	Ghana Institution of Surveyors
GNI	Gross National Income
GPRS	Growth and Poverty Reduction Strategy
GSGDA	Ghana Shared Growth Development Agenda
GSS	Ghana Statistical Service
GWCL	Ghana Water Company Limited
HR	Human Resource

ICT	Information and Communications Technology
INDCs	Intended Nationally Determined Contributions (INDCs)
JHS	Junior High School
KNUST	Kwame Nkrumah University of Science and Technology
KPIs	Key Performance Indicators
LICs	Low Income Countries
LTNDP	Long-Term National Development Plan
MDAs	Ministries, Departments and Agencies
MMDAs	Metropolitan, Municipal and District Assemblies
MOF	Ministry of Finance
MoWH	Ministry of Works and Housing
MRH	Ministry of Roads and Highways
MSLC	Middle School Leaving Certificate
NADMO	National Disaster Management Organisation
NCCAS	National Climate Change Adaptation Strategy
NCCP	National Climate Change Policy
NDPC	National Development Planning Commission
NEP	National Environment Policy
NER	Net Enrolment Rate
NICs	Newly Industrialised Countries
NSDF	National Spatial Development Framework
ODF	Official Development Fund
OECD	Organisation for Economic Co-operation and Development
PPIAF	Public Private Infrastructure Advancement Fund
PPP	Public Private Partnership
SEA	Strategic Environment Assessment
SHS	Senior High School
SMEs	Small and Medium-sized Enterprises
SSA	Sub-Saharan Africa
SSSCE	Senior Secondary School Certificate Examination
STEM	Science, Technology, Engineering and Mathematics
STI	Science, Technology and Innovation

UK	United Kingdom
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WASSCE	West African Senior School Certificate Examination

EXECUTIVE SUMMARY

CLIMATE RESILIENCE, DISASTER RISK REDUCTION AND ENVIRONMENTAL SUSTAINABILITY

Certain human activities like the burning of fossil fuels and land use changes among others, have led to increasing volumes of carbon dioxide emissions and other greenhouse gases (GHGs), which in turn have contributed to climate change and its resultant effects. It has been predicted that the mean surface temperature of the world is likely to increase between 0.3°C and 4.8°C by the end of the 21st century, resulting in changing weather patterns (e.g. heat waves, which will occur more often and last longer, and extreme precipitation events, which will become more intense and frequent), rising sea levels and increased coastal erosion, and warming and acidification of the ocean¹.

An overlay of stimulated 10-year interval shoreline positions in central Accra; showing the Independence Square and parts of the CBD



With many aspects of Ghana's societal activities dependent on critical infrastructure that supports access to energy (e.g. electricity), water, communications, transportation, health, food, etc., extreme climate related events such as droughts and floods will severely impact on the country's economy, if the necessary steps are not taken to build climate resilience. For example, the cost of damage caused by the 3rd June 2015 flood event in Accra, which was followed by a filling station explosion, was estimated at \$55million and reconstruction costs for only the transport, housing and water sectors at \$105 million².

Climate-proofing existing and new infrastructure is therefore essential for coping with disasters, although when inadequately carried out, will rather increase social and economic susceptibility to risks and inhibit effective response to the disaster. In addition, sustainably managing the country's natural resources is not only critical for economic growth and sustainable development but also for maintaining essential

¹ IPCC Climate Change 2014 Synthesis Report – Summary for Policy makers. https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

² <https://www.ghanabusinessnews.com/2017/05/30/reconstruction-costs-after-accra-floods-estimated-at-105m-world-bank/>

ecosystem services that decrease the vulnerability of communities to disasters and mitigate climatic impacts.

Ghana has been committed to responding to the challenges of climate change both internationally (from signing of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 to the more recent Paris Agreement, as international commitments for moving the action forward), and nationally (where climate change and environmental issues have been integrated into its developmental framework for achieving sustainability). The 2014 National Climate Change Policy (NCCP) and its Action Programme for Implementation (2015-2020), for example, are key national documents that have highlighted the importance of resilient systems.

As part of the Ghana Infrastructure Plan, five priority actions are proposed for increasing resilience of critical systems, and addressing climate change disaster risk reduction and environmental sustainability for Ghana over the next 40 years. These are:

- Improved quality and access to information
- Strengthened institutional and individual capacity
- Increased resilience of built and natural infrastructure
- Integration of resilience in sectoral planning and budgeting processes
- Resilience principles incorporated into National Investment Strategies and Plans

These actions are to be mainstreamed into national development planning and budgeting processes. Applying such sustainability tools like the Strategic Environment Assessment and the Environmental Impact Assessment will support the integration of environmental information into decision making processes. Incorporating monitoring and evaluation frameworks will also assess implemented strategies and report on adaptation needs for achieving successful climate resilience.

CONSTRUCTION INDUSTRY DEVELOPMENT

Globally in the 21st century, infrastructure is the lifeblood of prosperity and economic confidence. Successful delivery of well-planned infrastructure investments offers developing economies and for that matter Ghana, an opportunity to compete in the global marketplace. Construction is the mechanism through which infrastructure is delivered. The construction industry is important, plays a key role in Ghana's economy, and establishes the physical foundations and environment for its long-term development. Almost every economic activity is linked up with the construction industry. Consequently, the growth and development of any economy is directly or indirectly connected with the construction industry. Economic development cannot thus be achieved on the back of a fragile and ill-equipped construction industry.

The Ghanaian Construction Industry Context

The Ghanaian construction industry derives many of its practices from the British construction industry. It is the backbone of the Ghanaian economy and contributes between 8% and 12% to the overall gross domestic product (GDP). The industry is a major source of employment, with between 2 percent and 3 percent of the active population engaged in the industry. The Ministry of Works and Housing (MoWH), which is responsible for initial registration and classification of contractors, has more than 20,000 building contractors on its register. This is a relatively large number, given the size of Ghana's economy. Data from MoWH puts the 2010 figure at about 34,000 registered contractors.

Performance Standards in the Ghanaian Construction Industry

At its best, the Ghanaian construction industry exhibits admirable excellence and has delivered quite a few landmark infrastructure projects. As far back as the 1950s, Ghanaian construction firms were involved in delivering some of the excellent post-independence infrastructure. However such excellence appears too few and far between and is not replicated consistently throughout the industry. The inconsistency in delivery performance of the Ghanaian construction industry is a major cause of concern amongst client groups and other construction industry stakeholders. Failure to meet performance targets within the Ghanaian construction industry is a common shortcoming. Contractors are almost invariably blamed and criticised when there are problems with project delivery. Contractors are sometimes perceived as deficient in the application of requisite management techniques and their performance is one of the weakest links and the cause of overall industry performance. This is by no means the only factor responsible for industry underperformance; there are many associated factors that undermine the industry's ability to deliver.

Skills Development in the Ghanaian Construction Industry

Ghana is not producing the numbers of professionals for the construction industry that are able to sufficiently meet the needs of the growth and development of the Ghanaian economy. For example, with 839 registered architects at the end of 2016, Ghana has in excess of 33,000 inhabitants per architect. This ratio is very high compared to other countries with developed construction industries. Similarly, with about 1,500 quantity surveyors in good standing at the end of 2016, there are more than 17,000 persons to 1 quantity surveyor, compared with 1,400 persons to 1 quantity surveyor in the UK. While

in recent times, more educational institutions are offering training for construction professionals, the quality of training needs to be monitored to ensure it is in line with best-practice global trends. Further study needs to be undertaken to assess the quality and quantities of other professionals such as structural engineers, planners, services engineers, land surveyors etc. to ensure sufficient numbers of quality professionals are being trained who are able to sustain Ghana's developmental and growth projections. New postgraduate courses such as the MSc. Procurement Management, MSc. Construction Management, MSc. Project Management, introduced by KNUST will be boosted to support the capacity of managers in the construction industry. In addition to quality graduate professionals, the quality of skilled and unskilled trades' operatives will be developed through a system that ensures that all operatives possess relevant trades' qualification and certification. Training and other institutions like the Centre for Technical, Vocational Education and Training (COTVET) will provide programmes leading to certification as well as continuing development opportunities for all operatives and artisans for all trades employed in the Ghanaian construction industry.

Action Agenda for Transforming Construction in Ghana

The following recommendations are made to reflect the needed actions required to transform the Ghanaian construction industry into an industry fit for purpose and delivering twenty-first century excellence. Some of the specific actions proposed are as follows:

- a. Improving access to finance and credit for construction projects;
- b. Bridging the Housing deficit;
- c. Promoting and supporting research;
- d. Performance monitoring and measurement;
- e. Leadership of the construction industry;
- f. Scaling up Infrastructure development;
- g. Development of local materials and equipment;
- h. Reducing construction costs;
- i. Improving Skills development

Need for a Regulatory and Development Body

To surmount these challenges the Ghanaian construction industry will pursue a vision of a construction industry development strategy and agenda that could promote stability, foster economic growth and international competitiveness of local industry players, create sustainable employment, and address any historic imbalances as it attempts to generate a new construction industry capacity. A model for development of Ghana's construction industry has been proposed at the core of which is the proposal for the establishment of a central agency. From the work so far done, the consensus was to establish a Construction Industry Development Authority (CIDA) for Ghana. Currently, a Legislative Bill, which sets out the details and proposals for the establishment of CIDA, has been drafted and comments/queries from the Attorney Generals' Department have been responded to. Similar challenges in other emerging countries resulted in the

establishment of central agencies to coordinate the activities of all construction works. Most of these countries are making very remarkable strides comparatively towards economic development.

The mission of the proposed body is to build a world-class construction industry to enhance the competitiveness of the industry's people, products and businesses. CIDA- Ghana will aim to develop the capacity and ability of the players in the Ghanaian construction industry, to enhance the quality of the industry's work, profitability and productivity through the promotion of professionalism, innovation and knowledge.

Key Pillars of the Proposed CIDA Model

The framework for the establishment of the proposed CIDA-Ghana will be anchored on three (3) thematic areas Construction Business Development (Process), Construction Technology Development (Tools) and Construction Manpower Development (People). These key pillars represent the short, medium and long-term priorities for the construction industry development programme.

The proposed CIDA will not be a panacea for all the issues facing the construction industry. For example, payment delays impact the growth of firms, and by so doing, have an adverse effect on the efforts by the nation to develop a network of construction firms able to deliver national assets, contribute to the economy of Ghana and enhance the quality of life of Ghanaians by giving value, utility and enjoyment in the buildings and infrastructure items they build. However, CIDA cannot directly influence the efficiency of the national budgeting and financial administration regime.

Moving Forward

Ghana's construction industry has some strength that has been identified and can be used as the foundations for further improvements in the performance of the industry. The construction in Ghana faces numerous challenges including a weak regulatory and development framework, financial, human resource and material constraints beside others.

The construction industry development agenda in Ghana cannot be accomplished over the short term but will be delivered by a radical and rationalised restructuring of the industry and continuously managed, administered and monitored. Developing the industry is a deliberate activity which requires a long-term approach; second, industry development programmes require the involvement of various stakeholders of the construction industries to succeed, but the Government of Ghana must of urgency play the lead role in order to ensure a strong, effective and efficient industry; and third, there are likely to be dissenting voices among the practitioners who might perceive that they might lose power or influence. Country-specificity is key. Thus, it is important to understand the particular context that will influence change in Ghana. Despite the many lessons, which the country can learn from the experience of other nations, ultimately, only a truly Ghanaian solution will work.

HUMAN RESOURCES AND SKILLS PLANNING

In order to attain the vision of becoming a high income country by the end of the year 2057, Ghana must take pragmatic steps to ensure that the right skills set and capacity are adequately planned for and acquired in the delivery of the objectives of the GIP.

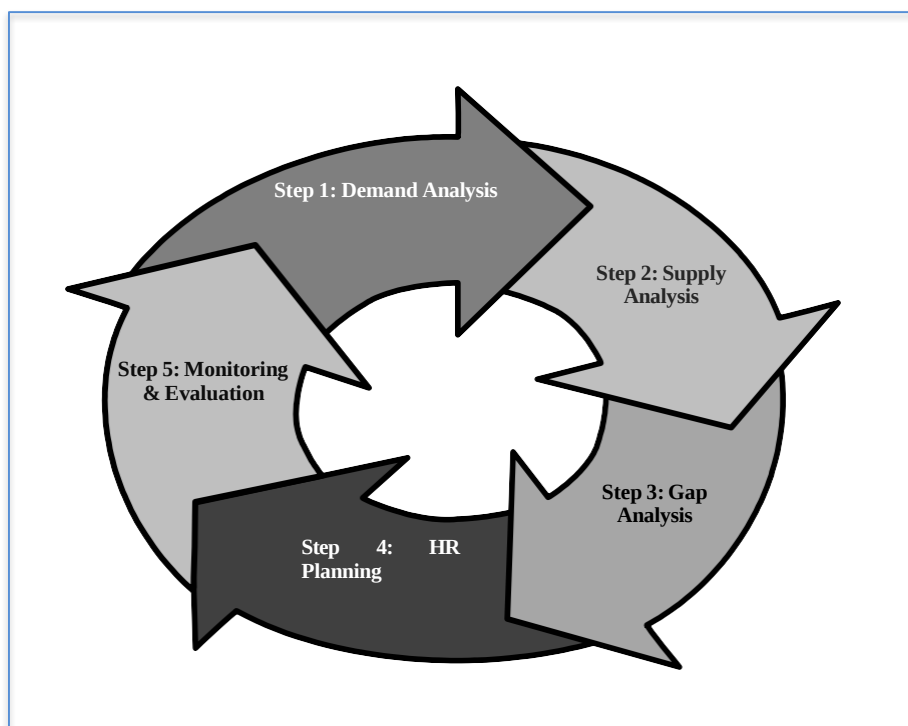
Currently, about 79.6% of Ghana's population falls within the working age group (15- 60), which serves as a potential for the supply of adequate labour to accomplish the country's basic socio-economic activities. However, the pattern of education shows that about a quarter of Ghana's population has never had any formal education, while the number of people acquiring formal education also reduces markedly as one goes up the academic ladder. A significant proportion of the potential labour pool are therefore without the requisite certification to be absorbed into the formal public or private sector and are hence restricted to the informal sector.

It is therefore recommended that Government introduces measures to encourage pre-secondary students to either attend secondary school or vocational institutions in order to develop and sharpen their talents, as the level of educational attainment does not only serve as a basic indicator for determining the type and source of labour in an economy, but also enhances the skills an individual acquires, and determines a person's potential in labour force participation and wage earning potential.

Today, Ghana pales in comparison to other emerging economies like South Korea, Malaysia and Singapore, which had a comparable socio-economic status at the time that the country gained independence in 1957. The country is performing very poorly as far as investments in education and the resulting GDP per capita output are concerned. The proposal is for Ghana to commit not only to significant educational and economic reforms, but to link these reforms to socio-economic advancements that could place the country among the highly developed economies.

In planning for the HR requirements of the GIP, thoughts were drawn from the experiences of developing countries like Namibia, together with research from developed countries like the UK and Canada as well as South Korea in order to outline a universally applicable approach.

The HR Planning Framework



Developing an HR framework at the national level for the GIP should be based on the government's programme of action for priority projects (as outlined in the GIP). In developing an HR planning framework, several processes are considered including: needs-based analysis, policy planning and decision making, development of required human resources policies, action planning, implementation and monitoring and evaluation.

The HR planning framework defined for the purposes of this assignment, outlines a 5 step approach from the demand and supply analyses stage to the identification of gaps, HR planning and finally monitoring and evaluating the performance and effectiveness of the plan respectively. The following must be undertaken at each step:

Step 1: Demand Analysis

- Occupational grouping;
- Demand by occupational group per sector;
- Replacement demand by occupational group; and
- Total demand forecast.

Step 2: Supply Analysis

- Analysis of internal and external sources of supply (Tertiary, Technical and Vocational, national labour force, Formal and Informal Sector records); and
- Total Supply Forecast by occupational grouping.

Step 3: Gap Analysis

- Total demand – Total supply; and
- Forecast of shortages and surpluses by occupational grouping.

Step 4: HR Planning

- Policy/legislative recommendation; and
- GIP Human Resource Plan.

Step 5: Monitoring and Evaluation

- Reporting Framework; and
- GIP Monitoring and Evaluation Framework.

The level of importance attached to infrastructure development in the country is revealed in the establishment of the Ghana Infrastructure Investment Fund (GIIF). There is, however, the need to ensure that the appropriate manpower is available at all times to deliver on these infrastructure objectives.

As far as human resources go, a huge potential exists that can be trained and tapped into for the implementation of infrastructural projects in the country over the period of the GIP. Maintaining a sustainable workforce in the Ghanaian infrastructure sector is necessary to ensure a constant stream of manpower supply.

The foremost challenge in this field, however, is the lack of information to collate and assess the depth of skills and the issues relating to its availability (including underutilised and unutilised skills), gaps and mismatches in many low – lower middle income countries. The recommendation, therefore, is for greater investments to be channelled into physical infrastructure projects to build and sustain domestic capacity.

Chapter 1 Context of the Ghana Infrastructure Plan

1.1 Introduction

The National Development Planning Commission (NDPC – also called the Commission), acting in accordance with the 1992 Constitution embarked on a process in 2015 to develop a Long-term National Development Plan (LTNDP) to shape the scope and content of the medium term plans that the country has used for decades. The vision for the long-term development framework is based on the 1992 constitution and the aspirations of Ghanaians as expressed during nationwide consultations organised by the Commission between 2015 and 2016.

1.1.1 Path to High-Income Country Status

The LTNDP envisages that by 2057, when Ghana celebrates its 100th independence anniversary, the country's economy would be:

- i. Ranked among high-income countries;
- ii. Export-oriented, industrialised, diversified and resilient;
- iii. Driven by Ghanaian entrepreneurship;
- iv. Characterised by high-value services;
- v. Dynamic, with a globally competitive manufacturing sector;
- vi. Have an efficient agricultural sector capable of feeding the nation and exporting to global markets.

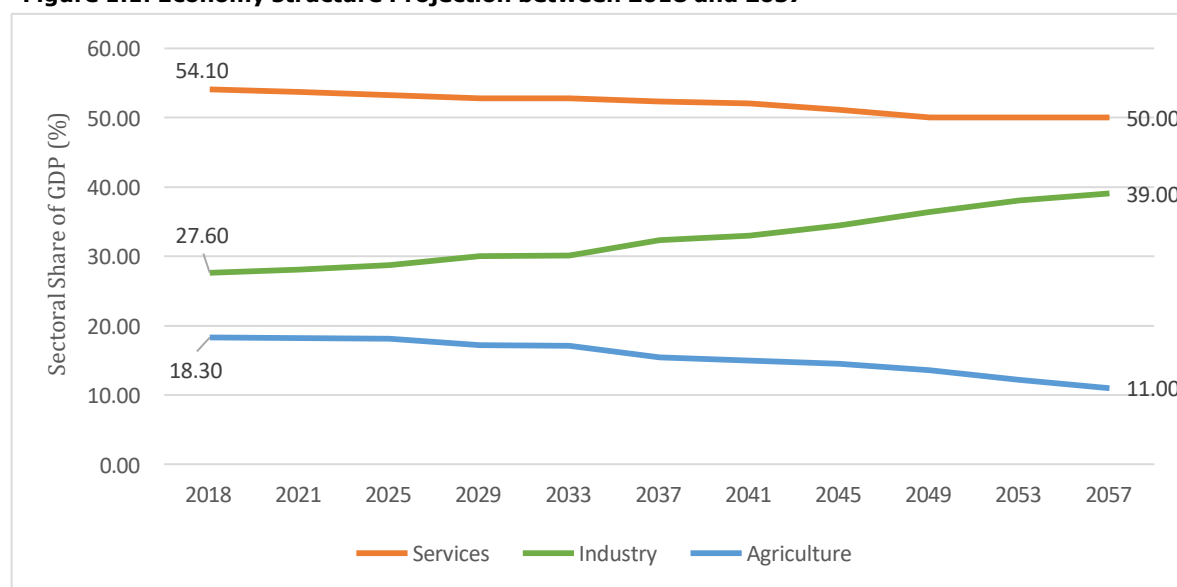
1.1.2 Ghana's Economy by 2057

The LTNDP is expected to facilitate Ghana's transition from a lower middle-income country to a high-income one by 2057. Under the Plan, the Commission expects Ghana's economic output, or Gross Domestic Product (GDP), to increase from an estimated US\$45.5 billion in 2018 to about US\$ 3.6 trillion in 2057, driven by an ambitious programme of industrialisation and export-led growth. Average national income (or per capita gross national income (GNI)) is expected to grow to just about US\$60,000, about US\$22,000 in today's prices.

Underlying this ambitious programme of economic transformation would be extensive policy and institutional reforms to attain and sustain macroeconomic stability over the period while pursuing sectoral policies to free the entrepreneurial energies of Ghanaian, raise household incomes, and reduce overall poverty to its barest minimum.

The structure of the economy for the next 40 years as projected by the NDPC is represented in Figure 1.1.

Figure 1.1: Economy structure Projection between 2018 and 2057



Source: NDPC, 2016

Infrastructure will play a key role, and the logistics sector will be developed to ensure maximum use of physical infrastructure. It is expected that by 2047 (10 years before the end of the full long-term plan), the infrastructure assets of Ghana would have been substantially developed to support the implementation of the Long-term Plan and the consolidation and maintenance of progress in the years to come.

1.1.3 Population and Urbanisation Rates

NDPC projects a population of 57 million by 2057, at an average per capita annual growth rate of 1.8%, as indicated in Table 1.1. The overall strategy of the LTNDP is to combine the lessons of Ghana's development record with the future needs of a growing and urbanising population. The country's urbanisation rate for 2057 is projected to be 73%.

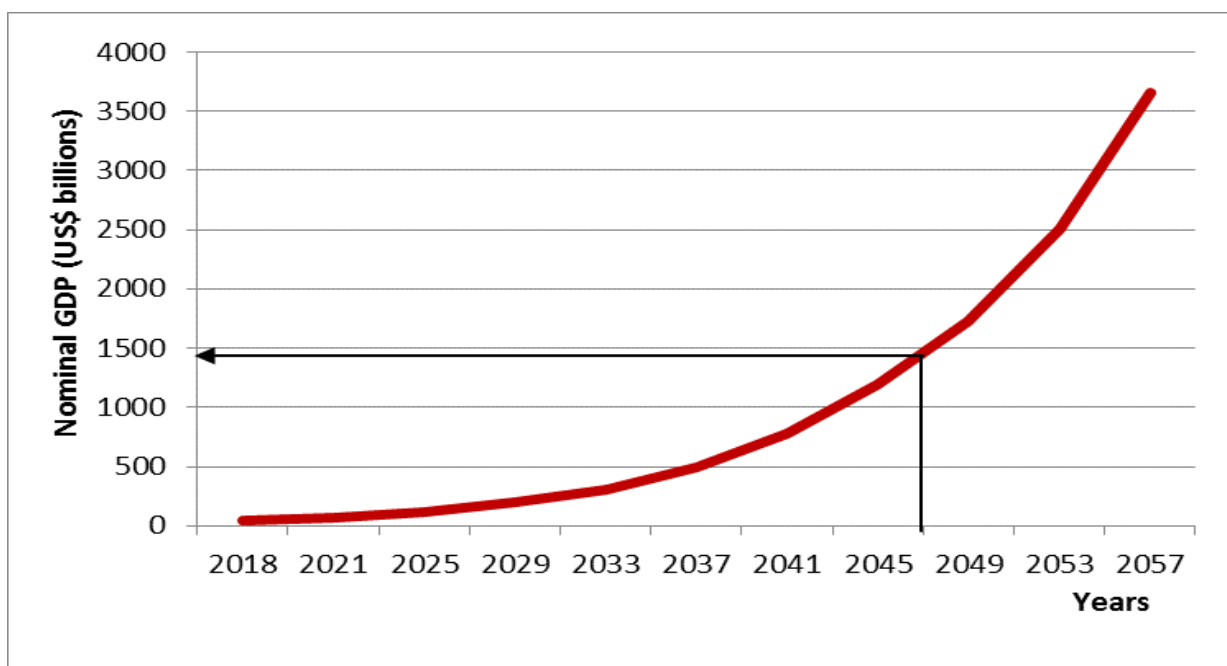
The projected nominal GDP, population and average income per capita, as shown in Table 1.1, are graphically represented in Figures 1.2, 1.3 and 1.4 respectively. The values for 2047 (i.e. three 10 year successive planning periods) are indicated by the black target lines in all cases.

Table 1.1: Indicative socio-economic forecasts for the LTNDP

	Nominal GDP	Population	Average Income/capita
2018	45,564,368,220	28,595,511	1,545.61
2021	72,985,307,591	31,350,200	2,237.81
2025	119,000,617,944.12	34,256,905	3,350.00
2029	194,027,367,132	37,145,602	4,959.90
2033	310,794,325,134.34	40,329,218	7,336.34
2037	497,832,413,869	43,590,722	10,927.58
2041	783,348,941,258.02	47,031,554	16,156.14
2045	1,189,178,848,428.63	49,862,784	23,133.56
2049	1,728,448,467,519.97	52,442,784	31,969.99
2053	2,512,267,596,736.01	54,895,789	44,434.28
2057	3,651,533,230,870.54	56,998,784	62,202.57

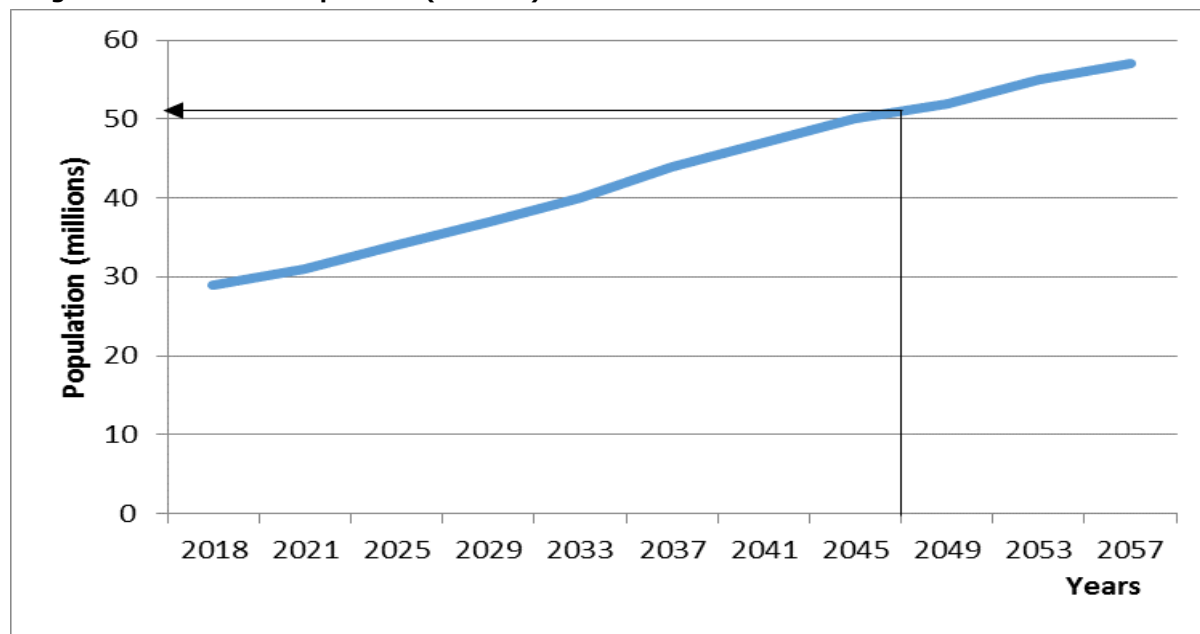
Source: NDPC, 2017

Figure 1.2: Estimated Nominal GDP (billions) 2018-2057



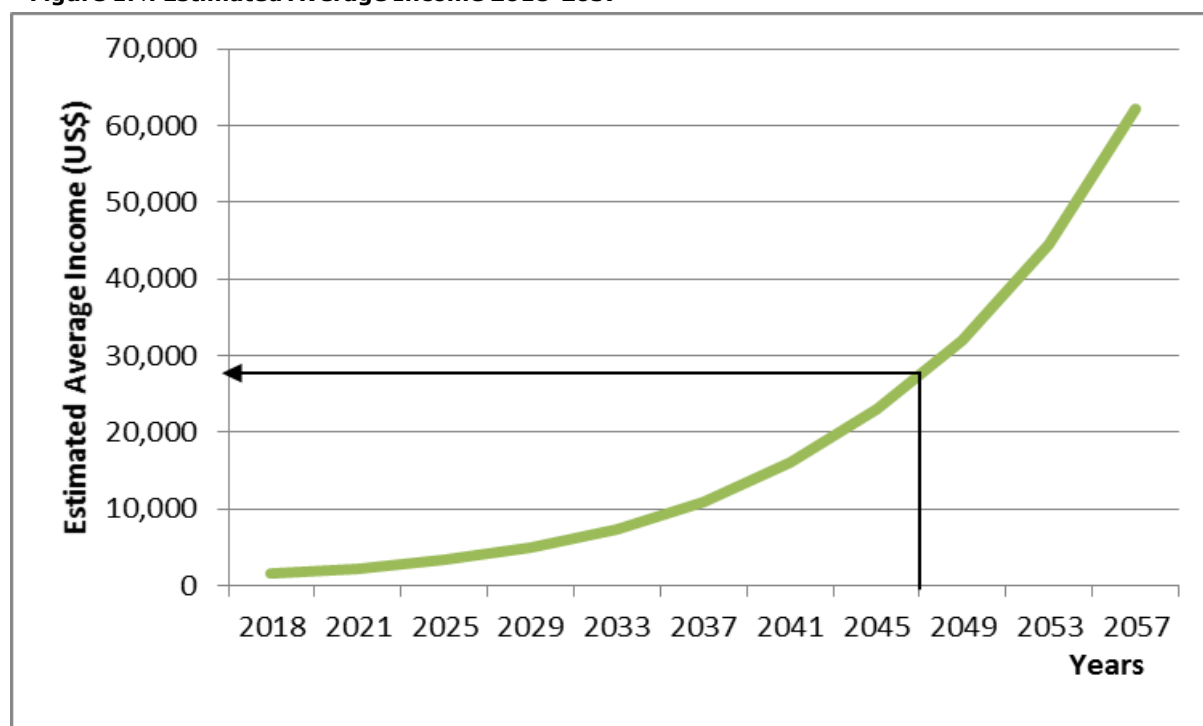
Source: NDPC, 2017

Figure 1.3: Estimated Population (millions) 2018-2057



Source: NDPC, 2017

Figure 1.4: Estimated Average Income 2018-2057



Source: NDPC, 2017

1.2 Status of Infrastructure Sector

Ghana has made major strides in modernising and extending some its infrastructure stock, including roads, telecommunications, and ports. However, service delivery in other areas, such as water, sanitation and electricity lag behind significantly. Population and economic growth have thrown a harsh spotlight on infrastructure bottlenecks and accentuated the demand for increased infrastructure services in these areas.

The 2016 Afrobarometer survey reflects these concerns and asserts that some residents of the country still do not have access to basic services. This is confirmed by a survey by the Association of Ghana Industries (AGI), which indicates that infrastructure quality is still perceived by business users to be unsatisfactory. Again, the Global Competitiveness Report 2015/16 ranks Ghana's infrastructure quality 120th out of 140 countries. This establishes the extent Ghana has to go, as a country, in order to reach standards befitting a country aspiring to be high-income. According to the report, Ghana ranks low in overall quality of transport and electricity supply, at 120th and 127th respectively, out of 140 countries and 94th in terms of port infrastructure. It is important to acknowledge these issues as a useful starting point to identify and understand the fundamental challenges that the infrastructure sector of Ghana is facing. Electricity, transport, water and sanitation, and housing are probably the most important services required by the majority of the population.

1.2.1 Electricity

The rapid growth in electricity demand and low water inflows to the Akosombo and Kpong hydropower reservoirs as well as lack of coherent sector planning, led the country into a crisis, with an electricity supply deficit and a consequent power load shedding severe enough that it derailed the achievement of economic growth targets. The power shortages slowed down businesses and manufacturing activities including the operations of mines.

Although Ghana is doing relatively well in overall electricity access in Africa, as reflected in an estimated overall rate of access of approximately 65% in 2012 according to the World Bank, this pales in comparison to Ghana's peer group of middle income countries.

1.2.2 Transportation

The country has a transportation system consisting of two large deep-water ports, a 947 km railway system, a 72,000 km maintainable road network, one international airport and eight regional airports and airstrips located throughout the country. Certain inefficiencies exist in the transport sector that pose a major threat to growth and development. First of all, there are no available alternatives to road transport for movement of bulk commodities for export. These would be better handled by rail. The railway system, which has limited coverage, serves only the southern part of the country, including Tema, and is virtually broken. Related to the rail transport is also an efficient public rail transport system to serve the masses.

1.2.3 Water and Sanitation

Numerous economic and social activities in both private and public sectors rely on the supply of clean water and adequate sanitation for their operations (e.g. large retail, wholesale, food, and agro-processing sectors). However, almost a third of the population does not have access to safe drinking water and two-thirds do not have access to adequate sanitation. Managing the urban water delivery system is fraught with such challenges as intermittent water supply, inadequacy in extending supply to new customers and weak financial performance by the Ghana Water Company Limited (GWCL). With facilities being obsolete, the ability to deliver service to an urban population, growing at an average annual rate of 3.5%, is unduly stretched.

The increasing urban population also puts a strain on limited infrastructure, which, in the case of sanitation, calls for improved systems for the collection, management, treatment and disposal of urban wastes in order not to aggravate the pollution of the environment, water bodies and thus stimulate flooding.

1.2.4 Science and Technology

The speed with which quality information can be accessed, processed and utilised for technological, social and economic gains requires increased commitment to the

deployment of science, technology and innovation (STI) in our public and civic institutions. The optimal technology for high-speed telecommunications is fibre optic cable, but its widespread deployment is expensive. Currently, only a relatively small proportion of the country, primarily key business centres, is serviced with fibre optic cable.

1.2.5 Housing

The demand for housing far outpaces supply, resulting in relatively high cost of housing. Of particular concern is the current housing deficit, officially 1.7 million, but unofficially about 3 million. This huge backlog is estimated to be growing at 70,000 units per year. The provision of housing by the state has been characterised by high cost and cost overruns, rendering much of the housing units unaffordable to the many Ghanaians. This has contributed to emergence of slums and informal housing delivery systems, with such issues as overcrowding, decline in the quality of housing and associated facilities.

1.2.6 Other Sectors

Other challenges exist in the irrigation and drainage and flood control sectors, etc.

1.3 The Ghana Infrastructure Plan (GIP)

The GIP is a major component of the long-term development framework. It is based on the National Spatial Development Framework (NSDF), which was completed in February 2015 as well as the economic, social and spatial development of the long-term plan. The GIP encapsulates Ghana's vision and strategic direction for infrastructure development. It also defines investment principles and priorities over the first 30 years of the implementation of the long-term development framework. The aim of the GIP is to deliver economic, social, and environmental benefits to the country through the production of a defined and budgeted investment framework.

The development of the GIP, therefore, is to serve as a framework to address the challenges, using a combination of effective policy, institutional and financing measures, within a 30-year planning horizon. The document recognises the potential social consequences and provides the necessary interventions to avert possible socio-economic and spatial challenges.

1.3.1 Vision and Strategies for the GIP

The GIP will guide the formulation and implementation of the LTNDP that will run from 2018 to 207 and also chart a new strategic direction for infrastructure, guide the future direction of infrastructure delivery and define the nation's investment priorities for the first 30 years of implementation.

The GIP provides a coordinated and integrated approach to infrastructure planning, prioritisation, funding and delivery by engaging with key stakeholders across government, industry and communities while prioritising Ghana's infrastructure needs from the perspective of a prosperous nation. Although the GIP focuses largely on public infrastructure projects, it also addresses the need to create enabling conditions for

developing private infrastructure, and highlights opportunities for the private sector to engage government to find creative solutions for infrastructure delivery. Indeed, a large part of the programme will be financed by the private sector.

1.3.2 Ghana's Infrastructure by 2047

The new development framework envisages that by 2057 the country would be ranked among high-income countries of the world, with an industrialised, diversified and export-oriented economy that is resilient against the vagaries of the global economy. Ghana needs a modern network of infrastructure, well-planned and maintained, to support such a transformative national development agenda.

1.4 Benchmarking Ghana's Infrastructure against International Standards

Ghana's infrastructure performance in key sectors in terms of stock, access rates, quality and costs of services was compared to those in Middle-Income Countries (MICs) and High-Income Countries (HICs). This benchmarking exercise is useful to get a sense of the areas in which the scope for improvements is the largest, in order to help policy makers determine the level of interventions needed as the country transition from lower middle-income country to high-income country. Table 1.2 shows international infrastructure benchmarks for Lower Middle Income, Upper Middle Income and High Income Countries, while Table 1.3 shows the provisional infrastructure targets by 2057 as Ghana transitions to achieve high-income status³.

³ The information was obtained from the World Development Indicators and MDA reports submitted to NDPC.

Table 1.2: Benchmarking Ghana's Infrastructure access with international average benchmarks

Indicators		Year	Ghana	LMIC	UMIC	HIC
ENERGY	Electronic power consumption per capita (kWh)	2015	348	743	3,214	8,508
	Electricity generated by hydropower (% of total)	2015	64	16.8	20.1	13.1
	Access to Electricity (% of total population)	2012	64.1	78	98.7	99.8
	Electric power transmission and distribution losses (% of output)	2015	23	15.22	8.7	7
	Electricity production from coal sources (% of total)	2013	0	46.10	51.9	6.12
	Electricity production from natural gas sources (% of total)	2013	10.40	20.88	17.13	11.77
	Electricity production from nuclear sources (% of total)	2008-13	0	4.99	3.79	26.39
	Electricity production from oil sources (% of total)	2013	0	6.58	3.08	17.70
	Electricity production from oil, gas and coal sources (% of total)	2013	10.40	73.56	72.11	3.74
	Electricity production from renewable sources, excluding hydroelectric (% of total)	2013	0.023	3.75	3.07	61.49
FOREST COVER	Proportion of land area covered by forest (ha/annum)	2016	40.1	28.7	28.8	34.5
	Annual Rate of Deforestation	2016	-0.3	0.4	0.0	0.0
WATER	Internal Freshwater resources per capita (cu. m)	2015	1,131	3,065	6,594	11,319
	Access to improved water source (% of total population)	2016	89	90	95	99
	• Rural (% of Rural population)	2016	84	87	91	97
	• Urban (% of Urban population)	2016	93	94	97	99
	Households using piped water as major source of drinking water (%)	2015	15	52	80	96
	• Rural (% of Rural population)	2015	9	42	67	97
	• Urban (% of Urban population)	2015	20	67	88	97
	Households reporting access to a flush toilet (%)	2016	15	52	80	96
	• Rural (%)	2016	9	42	67	93
	• Urban (%)	2016	20	67	88	97
ICT	Mobile Cellular subscriptions (per 100 people)	2014	114.8	87.6	101.4	125.7
	Individuals using the Internet (% of population)	2014	18.9	22.6	47.7	80.6
	Fixed broadband subscriptions (per 100 people)	2014	0.27	2.35	12.71	30.62
	Fixed telephone subscriptions (per 100 people)	2014	1	4	-	42
	Internet users (per 100 people)	2014	18.9	22.6	-	83
	Ownership of a Personal Computer (per 100)	2007	0.6	4.6	12.4	67.4
HOUSING	Proportion with access to secure housing (%)	2010	13.5			
	Population living in slums (% of urban population)	2014	38	30	0.0	0.0

Source: World Development Indicators 2015; Energy Commission

Table 1.3: Indicative Infrastructure Targets envisaged under the LTNDP

<u>INDICATOR</u>	<u>Base Year</u>	<u>Baseline</u>	<u>Target (2047)</u>
<u>General</u>			
Nominal GDP US\$ Billion	2016	44.0	1,370
Per Capita GDP US\$	2016	1,546	27,195
Population in Millions	2010	24.659	51
Urbanisation Rate	2012	51	70
Annual Rate of Deforestation % (93,790 ha/y)	2006	-1.7	0
<u>Shelter</u>			
Household Size	2010	4.6	3.5
Number of Dwelling Units (in Millions)	2010	5.818	13.8
Number of Rooms (in Millions)	2010	5.467	23.39
Proportion with access to secure housing (%)	2010	13.5	90
Population living in slums (%)	2014	38	4
<u>Energy</u>			
Access to Electricity (% of total population)	2012	64.1	99
Total Energy Capacity (Installed) - MW	2016	3,800	50,168
Total Electricity production / GWh (Installed)	2016	16,401	297,200
Electricity consumption per Capita/KWh	2015	348	5,800
Total electricity losses (%)			
- Transmission	2016	4.5	3
- Distribution	2016	22.8	8
Renewable Energy stock (% in energy mix)	2016	0.7	18
Renewable Energy (Total installed in MW)	2016	28	9,000
<u>Irrigation</u>			
Total Irrigated land per arable land (ha)	2012	12,042	834,804
Irrigated lands per arable land (%) [7.93 mil]	2012	0.15	10.5
<u>Water Supply</u>			
Internal Freshwater resources per capita /m3	2015	1,131	2,262
Total Freshwater resources per capita/m3	2015	1,941	2,911
Per Capita Water consumption (litres)	2012	50	300
Access to improved water source (% of total population)	2016	89	99
Households using piped water as major source of drinking water (%)	2015	15	90
Non-Revenue Water (% of water produced)	2014	50	10
<u>Sanitation (Sewerage)</u>			
Access to Safe Sanitation (%)	2014	15	95
Households reporting access to flush toilet (%)	2013	14	70
Sewerage network system (% of safe sanitation)	2013	3	50
Solid Waste Collection (% of waste generated)	2012	20	90
<u>Transport</u>			
Length of road network (km)	2014	71,419	253,000
Road Density (road-km/1000 km2)	2014	300	1,060
Road network in good condition (% network)	2014	35	70
Ratio of paved to total Road network %	2014	23	70
Vehicular population per 1000 persons	2015	64	250

Source: GLSS 6; Energy Commission and GIP Team, 2017

Chapter 2 Climate Resilience, Disaster Risk Reduction and Environmental Sustainability

2.1 Introduction

The progression of Ghana's economy depends on the networks of key built infrastructure and ecological services, which support the population's access to services such as energy, water, communications, transportation, health and food. The combined pressures from a growing population and exposure to a changing and variable climate, including extreme events, threaten public safety and the stability of the national economy. It is therefore essential that the nation's long term development plan incorporates appropriate strategies to safeguard the sustainability of infrastructure, ensure public health and safety and maintain important ecological services, while also taking advantage of opportunities that may be presented.

1.1. 2.1.1 Ghana's Climate Change Emissions

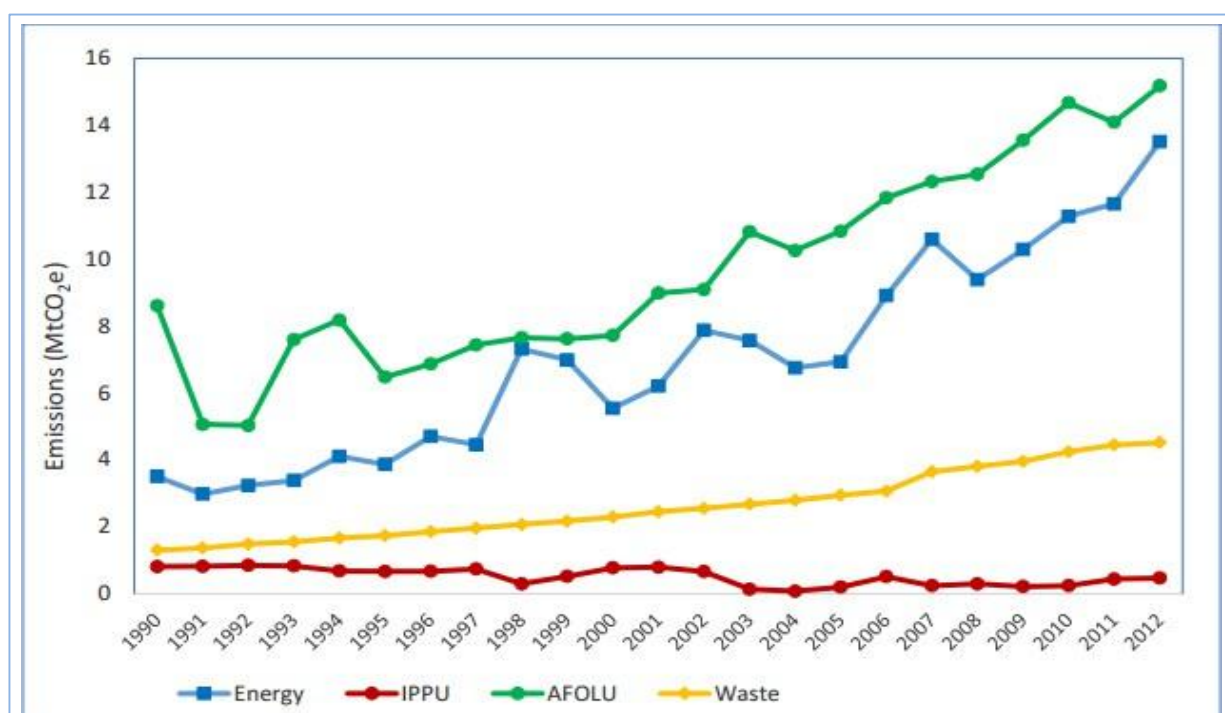
Ghana's growing population and expanding economy have contributed to increasing greenhouse gas emissions at the national level – from 14.22 MtCO₂e in 1990 to 33.66 MtCO₂e in 2012. Although contributing less than 0.1% to the total global GHG emissions, business-as-usual scenarios (BAUs) where no mitigation measures are instituted and observed point to increasing emission levels of up to 125.14 MtCO₂e by 2040⁴.

Four main sectors contribute to the total national GHG emissions (Figure 2.1):

- i. **Agriculture, Forestry and Other Land Uses (AFOLU)**, contributes 45% to the total emissions, mainly from livestock biomass, agricultural products, waste, timber, and non-timber forest products;
- ii. **Energy** creates 40%, mainly from the process of producing electricity/heat, e.g., burning of secondary fuels such as diesel, gasoline, and LPG. The transport sector is the largest source of emissions, followed by the other energy industries;
- iii. **Waste** produces 16.2%, mainly from the disposal of liquid and municipal solid waste; and
- iv. **Industrial Process and Product Use (IPPU)**, generates 1.5%, with GHGs mostly from diffuse point sources that are released as by-products of primary industrial processes.

⁴Government of Ghana (2015) Ghana's Third National Communication Report to the UNFCCC: 2015 Climate Change Report, Environmental Protection Agency: Accra (<http://unfccc.int/resource/docs/natc/ghanc3.pdf>)

Figure 2.1: Trends in greenhouse gas emissions from four key sectors in Ghana for the period 1990 – 2012



Source: EPA, 2015

2.1.2 Projections and Impacts

Climate change generally manifests as rising temperatures, declining total rainfall and increased variability, rising sea levels and increased coastal erosion, and higher incidences of weather extremes and disasters. The impacts of climate change will vary across the country's diverse geographical and ecological regions - i.e., rain forest, deciduous forest, forest-savanna transition zone, coastal savanna and northern savanna (Guinea Savanna and Sudan Savanna) ⁵, with differing vulnerabilities and adaptive capacities of physical elements (e.g., infrastructure) and socio-economic elements (e.g., communities). For temperature and rainfall, the spread of change will be more intense towards northern Ghana than the south.

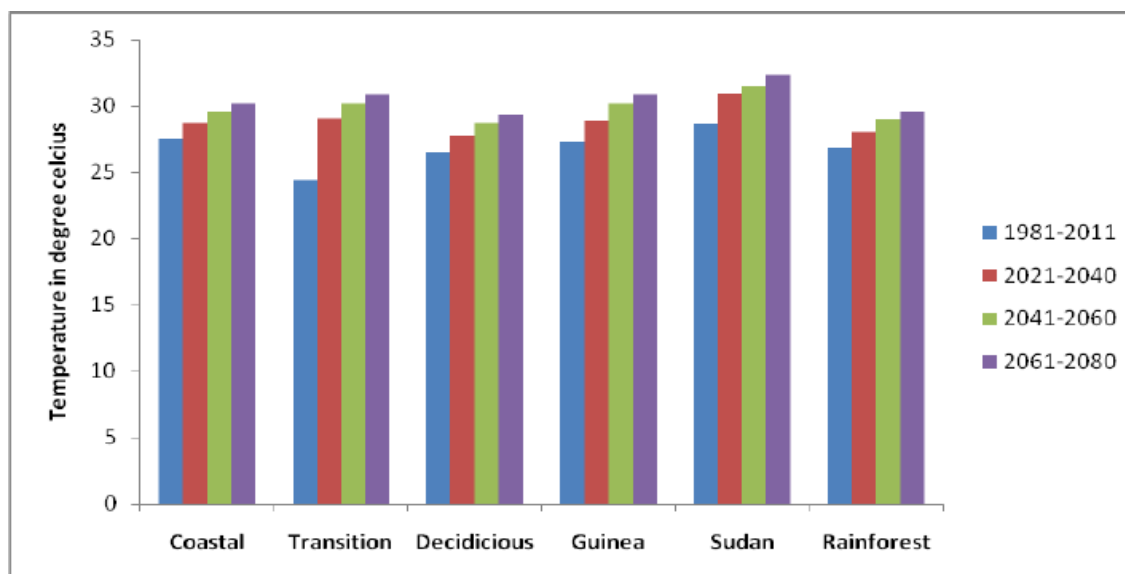
Temperatures

The country exhibits an average temperature range between 24°C to 30°C, with instances of 18°C and 40°C in the southern and northern parts, respectively (Figure 2.2). Based on patterns of rainfall recorded between 1981 and 2010, mean temperatures are likely to increase in the near future (2040) by 3.8% (1.02°C), slight increase of 5.6% (1.5°C) by 2060 and further increase of 6.9% (1.8°C) by 2080⁶.

⁵Government of Ghana (2015) Ghana's Third National Communication Report to the UNFCCC 2015 Climate Change Report

⁶ ibid

Figure 2.2: Trends in observed and projected mean temperature in the agro-ecological zones in Ghana



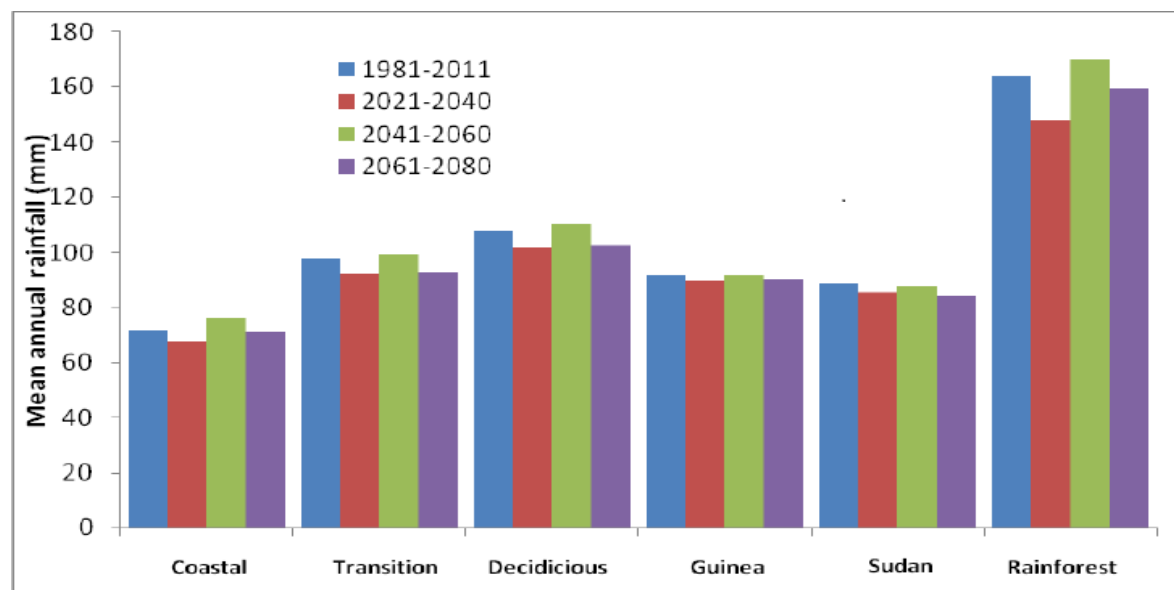
Source: EPA, 2015

Rainfall

This generally decreases from the southern to northern regions of the country, ranging from 2000mm to 1100mm annually, at the extreme southwest and extreme north, respectively. Projections show a decrease in rainfall patterns by 2.9% for the near future in 2040, followed by a slight increase of 1.1% by 2060, and decrease by 1.7% by 2080⁷ (Figure 2.3).

For all the agro-ecological zones, mean annual rainfall will likely reduce by about 10%, with decreasing levels during the major rainfall season (by 10% for all zones), and a slight increase in other months (although by less than 10%).

Figure 2.3: Trends in observed and projected mean rainfall in the agro-ecological zones in Ghana



Source: EPA, 2015

⁷ ibid

Sea Level Rise

Historical data shows an average increase by 2.1mm, with projections of 5.8 cm, 16.5 cm, and 34.5 cm by 2020, 2050, and 2080, respectively. Mid-range scenarios (with a 43 cm rise in sea level) indicate that approximately 19.4% of the population will be forced to migrate for the period 2000 – 2100 (for example, see Figure 2.4), with an estimate of 51.54% cost in residual damage, while US\$ 36.5 million of total damage costs will be incurred per year by 2100⁸.

Figure 2.4: An overlay of simulated 10-year interval shoreline positions in central Accra; showing the Independence Square and parts of the business district⁹



Source: Appeaning-Addo, J.K., 2015

Extreme Weather Events

In 2015, the country was ranked as the 8th most globally impacted by extreme weather events¹⁰. In addition to variations in the average climatic patterns, climate change includes extremes in weather conditions. Ghana's climate is highly variable and the country can expect more intense weather events, such as torrential rains, excessive heat and severe dry winds as a result of climate change.

2.1.3 Environmental Risks

Ghana's economy is based on the use of natural capital, which makes its sustainable management crucial for economic growth and sustainable development. Environmental degradation reduces the effectiveness of essential ecosystem services to mitigate climatic impacts and increases vulnerability and risks of communities to disasters.

⁸Brown, S. Kebede, A.S., and Nicholls, R.J. (2011) Sea level rise and impacts in Africa, 2000-2100, Southampton, U.K.

⁹Appeaning-Addo, K. (2014) Managing shoreline changes under increasing sea level rise in Ghana. *Coastal Management*, 42(6), 555-567.

¹⁰ Kreft, S., Eckstein, D., and Melchior, I. (2016) Global Climate Risk Index 2017, Briefing Paper, <https://germanwatch.org/de/download/16411.pdf>

Air Quality

Air pollution is becoming an increasingly important environmental health risk. In parts of Accra for example, EPA has recorded high levels of particulate matter (PM₁₀) that exceed global and national standards¹¹, increasing the risks of respiratory diseases and other health impacts. Some airborne particles such as dust, soot, and other gases interact and form new mixtures, often with the influence of heat and ultraviolet radiation, causing warming influences on the climate in addition to impacts on public health, food, water and security.

Land

Ghana's level of land degradation (69%) is well above the 43% average level for West African countries ¹² . About 70% of the land area is prone to soil erosion and desertification¹³ and primary forests are being rapidly depleted at the rate of 2% per annum ¹⁴ . Climate change and variability will exacerbate the already declining productivity with serious impacts on livelihoods and food security, especially for smallholder farmers who contribute 80% of the country's agricultural production.

Freshwater

The country is well-endowed with freshwater resources. Continued pollution trends can however lead to a water crisis by 2030¹⁵, even without the impacts of climate change. Changing precipitation patterns are already causing variations in the distribution and availability of surface and groundwater resources. Annual flow in the Volta Basin, for example, is projected to fall by 24% in 2050 and 45% in 2100¹⁶. This can increase the risks for flooding and drought, as well as exacerbate many forms of water pollution through contamination. With sea level rise, the location of saltwater/freshwater interfaces can lead to saltwater intrusion.

Biodiversity

Currently, factors such as overexploitation, land use changes, chemical and nutrient pollution, invasive alien species, and wild fires, are rapidly declining the rich biodiversity of the nation's forests, dry and sub-humid areas, and aquatic ecosystems. Rising temperatures and erratic rainfall will have implications on the health and distribution of the diverse flora and fauna. The geographical distribution and productivity of cocoa, an important economic crop, for example, will shift as it can only profitably grow under temperatures between 30–32°C¹⁷.

2.1.4 Infrastructural Vulnerability

Infrastructure has been identified as the key factor in the ability of a country to withstand extreme natural events such as floods and storm surges ¹⁸ . Critical infrastructure, particularly relevant to crises and disasters, is defined as "organisational and physical structures and facilities of such vital importance to a nation's society and

¹¹ Environmental Protection Agency (2017) Trends of PM₁₀ in Accra (2005-2015), unpublished

¹² EPA (2011) Ghana Strategic Investment Framework (GSIF) For Sustainable Land Management (SLM) 2011 – 2025. Environmental Protection Agency 119 pp

¹³ World Bank (2006) Ghana Country Environmental Analysis, Environmentally and Socially Sustainable Development Department, Africa Region, World Bank

¹⁴ Forestry Commission (2015) Ghana National REDD+ Strategy. Republic of Ghana/Forestry Commission/GhREDD+/Forest Carbon Partnership Facility. Accra.

¹⁵ <http://www.csir.org.gh/index.php/latest-news/115-pollution-of-ghana-s-water-bodies-csir-predicts-water-crisis-in-2030>

¹⁶ McCartney, M.; Forkuor, G.; Sood, A.; Amisigo, B.; Hattermann, F.; Muthuwatta, L. 2012. The water resource implications of changing climate in the Volta River Basin. Colombo, Sri Lanka: International Water Management Institute (IWMI). 40p. (IWMI Research Report 146). doi:10.5337/2012.219

¹⁷ MESTI (2015) CBD Fifth National Report – Ghana. <https://www.cbd.int/doc/world/gh/gh-nr-05-en.pdf>.

¹⁸ UNU-EHS (2016) World Risk Report 2016, <http://collections.unu.edu/eserv/UNU:5763>

economy that their failure or degradation would result in sustained supply shortages, significant disruption of public safety and security, or other dramatic consequences”¹⁹. This consists of different kinds of infrastructural services including, but not limited to the following:

1. Energy (including generation, storage and distribution);
2. Transport networks (including vehicular, rail, water-borne and air transportation);
3. Water (including harvesting, storage, management, distribution, treatment and recycling);
4. Solid waste (including collection, distribution, processing, recycling and storage);
5. Communication networks (including telephone, cellular and data);
6. Social infrastructure (including education, healthcare, sports and recreation, law enforcement, fire and emergency services);
7. Food systems (including production, storage, processing and distribution); and
8. Mining and extractive sites.

According to the 2016 World Risk Report²⁰, Ghana placed 47th out of 171 countries based on its level of vulnerability²¹ which is made up of:

1. **Exposure to natural hazards:** an entity (population, built up area, infrastructure, and environmental area) exposed to one or more natural hazards (droughts, floods, sea level rise).
2. **Susceptibility:** the likelihood of suffering harm in the event of a natural hazard process.
3. **Coping and coping capacities:** the abilities of societies and exposed elements to minimise negative impacts of natural hazard and climate change through direct action and the resources available.
4. **Adaptation:** long-term process that includes structural changes, measures and strategies dealing with and attempting to address the negative impacts of natural hazards and climate change in the long term.

Climate-proofing existing and new infrastructure is therefore essential for coping with disasters. These must be adequately done to reduce social and economic susceptibility and enhance capacity for coping with disasters. Examples of concerns of climatic impacts on key sectors and related infrastructure include²²:

Energy

Ghana derives about 67% of electricity generation from hydropower but by 2020 it could derive only about 41%²³. The declining productivity will have dire economic consequences. Low levels of water in the Akosombo dam, for example, resulted in power rationing that caused GDP growth to fall from 8.8% in 2012 to 3.9% in 2015.

Transport

Road, rail, air and water (inland and maritime) infrastructure are vulnerable to direct impacts of climate change, including faster deterioration of transport infrastructure, frequent interruptions of operations and increased mortality and injuries. Cumulative estimates indicate cost of \$473 million from 2020-2100 to maintain and repair damages

¹⁹ BBK [Federal Office of Civil Protection and Disaster Assistance] (2016) in World Risk Report (2016) http://collections.unu.edu/eserv/UNU:5763/WeltRisikoBericht2016_small.pdf

²⁰ UNU-EHS (2016) World Risk Report 2016, http://collections.unu.edu/eserv/UNU:5763/WeltRisikoBericht2016_small.pdf

²¹ Relates to social, physical, economic and environmental factors which make people or systems vulnerable to the impacts of natural hazards and the adverse effects of climate change

²² Most of the examples were obtained from Climate Change Adaptation, Through Leadership and Assessments (ATLAS), (2017). Climate Change Risk Profile: GHANA, <https://www.climatelinks.org/resources/climate-change-risk-profile-ghana>

²³ Government of Ghana (2015) Ghana's Third National Communication Report to the UNFCCC 2015 Climate Change Report

caused to existing roads in Ghana as a result of climate change under the no adapt scenario²⁴.

Health

Changing temperature and humidity will influence the distribution and incidence of vector and water-borne diseases, such as malaria (expected to increase in the short term, particularly in coastal urban areas) and Guinea worm; and cholera, where outbreaks will increase in densely populated urban areas where access to water and sanitation is poor; as well as airborne diseases such as Cerebral Spinal Meningitis (CSM). Public health care facilities and emergency response systems are currently inadequate, and there is unequal access to health care delivery systems across Ghana, especially in rural and peri-urban areas some of which are without basic health services.

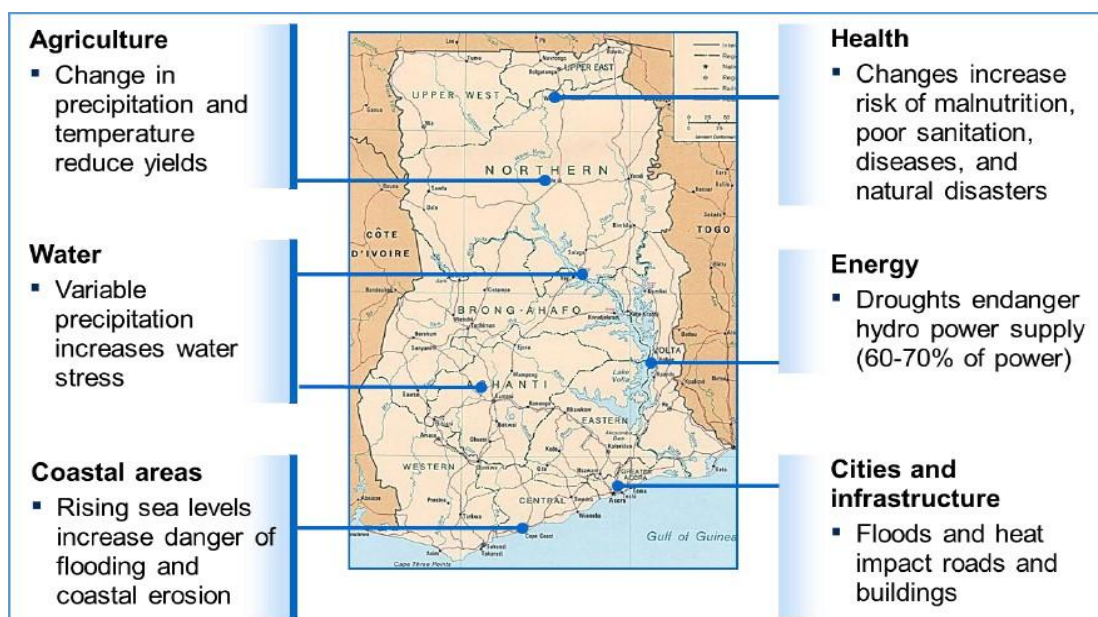
Water and Sanitation

Declining rainfall levels and rising temperatures will change surface flow regimes and groundwater recharge. Flow in the Volta Basin, for example, is projected to fall by 24% in 2050 and 25% in 2100. Prevalent land use activities, especially indiscriminate disposal of waste and sewage, threaten the quality of water, reduce storage capacity of water reservoirs and increase the cost of water treatment. With increasing demand from urbanisation and industrialisation, there will be water stress, higher demands, and conflicts.

Food

With only 2% of the irrigation potential of the country being used, shortening growing seasons and increasing unpredictability of the start of the rains will reduce yields of rain-fed agriculture. For example, yields from staple crops such as cassava and maize, are expected to decline by 29.6% in 2080 and 7% in 2050, respectively, and total crop failure is projected to occur every five years in Ghana's northern region.

Figure 2.5: Key climate vulnerabilities in different locations in Ghana²⁵



Source: EPA, 2015

²⁴ Twerefou, D.K., Chinowsky P., Adjei-Mantey, K., and Strzpepek, N.L. (2015) The Economic Impact of Climate Change on Road Infrastructure in Ghana, Sustainability, 7, 11949-11966, doi:10.3390/su70911949

²⁵ Government of Ghana (2015) Ghana's Third National Communication Report to the UNFCCC< 2015 Climate Change Report

2.2 Climate Change and Development in Ghana

The Ghana Shared Growth and Development Agenda II (2014-2017) acknowledges that climate change and variability constitute a major threat to national development but can be considered an opportunity to expand national output and productivity and embark on systemic protection programmes. Ecosystem management for climate change adaptation and disaster risk reduction are also recognised as “no regrets” investments.

2.2.1 Ghana’s International Commitments

The Government of Ghana has acknowledged that levels of poverty, climate change and environmental degradation need to be addressed through collaborative global and national efforts. As such, the country supports many global efforts for defining goals towards achieving a sustainable future whilst safeguarding the collective interest of all nations.

Since becoming party to the United Nations Framework Convention on Climate Change (UNFCCC), ratified in September 1995, the country has participated in the Conference of Parties (COP) for a number of years, signing all three of the Rio Conventions (on climate change, biodiversity and desertification). The Kyoto Protocol was adopted in 2003 and the country has published its first, second and third national communications to the UNFCCC in 2000, 2011, and 2014, respectively.

At the 21st COP held in Paris in December 2015, Ghana joined other countries in pledging to accelerate and intensify the actions and investments needed for a sustainable low carbon future. Ghana’s emission reduction goal is to unconditionally lower its GHG emissions by 15% relative to a BAU scenario emission of 73.95 MtCO₂e by 2030. With additional external support to cover costs of implementing the mitigation action (finance, technology transfer, capacity building), a total emission reduction of 45% below BAU emission levels can be achieved by 2030.

2.2.2 National Efforts

The Government of Ghana has been committed to continued integration of climate change and environmental issues into its developmental framework for achieving sustainability. For example, the Intended Nationally Determined Contributions (INDCs) programmes of action on climate change include 20 mitigation (Table 2.1) and 11 adaptation actions proposed for implementation between 2020 and 2030.

Table 2.1: Ghana’s INDC policy actions to achieve mitigation goals²⁶

Sector	INDC Policy Action	Actions
Energy	Scale up renewable energy penetration by 10% by 2030	5
	Promote clean rural households lighting	1
	Expand the adoption of market-based cleaner cooking solutions	2
	Double energy efficiency improvement to 20% in power plants	1
Transport	Scale up sustainable mass transportation	1
AFOLU	Promote sustainable utilisation of forest resources through REDD+	5
Waste	Adopt alternative urban solid waste management	3
Industry	Double energy efficiency improvement to 20% in industrial facilities	1
	Green Cooling Africa Initiative	1

²⁶ Ghana’s Intended Nationally Determined Contribution (INDC) and accompanying explanatory note (2015).

The National Climate Change Policy (NCCP) and Master Plan ²⁷ are comprehensive national actions that outline the country's approach for addressing issues of climate resilience, disaster risk reduction and environmental sustainability. Other key national documents include the National Climate Change Adaptation Strategy (NCCAS) 2012, National Disaster Management Organisation 2015 (NADMO) bill, the National Environment Policy (NEP) 2014, and Low Carbon Development Strategy, among many others.

2.2.3 Institutional Frameworks

A number of national institutions have mandates for supporting actions to address climate change. These include:

1. Ministry of Environment, Science, Technology and Innovation (MESTI) plays an oversight role of national climate change issues and coordinates with all relevant sector ministries, departments and agencies to ensure implementation of actions. This ministry also hosts the National Climate Change Steering Committee (NCCSC) to oversee the implementation of Ghana's National Climate Change Policy.
2. Ministry of Finance (MoF) coordinates climate finance;
3. National Development Planning Commission (NDPC) mainstreams climate change into national development planning at all levels;
4. Environmental Protection Agency (EPA) provides technical support; and
5. National Disaster Management Organisation (NADMO), Ministry of Interior, coordinates disaster management activities.

The Medium Term Development Framework has been used as a guide for mainstreaming climate issues into national development planning by all sectors. NDPC, MOF and MESTI have jointly offered training to all the sectors and districts on the importance of mainstreaming. They have also ensured and closely monitored evidences of climate change in the annual progress reports as part of the monitoring process.

2.2.4 Addressing Barriers

Institutions play a central role in implementing climate resilience actions and sustainable ecosystem management. Inadequate institutional structures and weak capacity are the nation's main challenges for synthesising information required to prioritise investments and coordinate actions among various stakeholders. However, these weaknesses can also create an opportunity to develop new systems for moving the climate agenda forward. Key issues to address include, but are not limited to:

1. **Information:** Availability of climate information can act as a facilitator to incorporating long-term climate assessment into national development processes. Decision makers and the general public need access to quality information to make informed decisions, i.e., adequate biophysical and socio-economic data at the appropriate scales, and technical capacity for integrating information into planning processes.

²⁷ Government of Ghana (2016) The Ghana National Climate Change Policy Master Plan Action Programmes for Implementation: 2015-2020, MESTI, Accra.

2. **Capacity Building:** Evaluating and building capacity needs is an important element for the successful implementation of resilience actions, and involves sharing information, research, monitoring, raising awareness, education and training, and other institutional activities.
3. **Finance:** Climate risks will lead to direct and indirect financial implications for the country, affecting net economic costs. Successful climate finance will depend on how policy formulation processes are linked with implementing institutional structures and the national budgetary system.
4. **Private Sector Engagement:** Decisions made by the private sector, usually profit-driven, can significantly influence actions for infrastructural resilience. Incorporating climate risks can reduce the costs of disruption to business operations as well as help realise new business opportunities arising from climate change, such as the expansion of markets for new and innovative products for resource efficiency.

2.3 National Priorities for Action

2.3.1 Principles of Resilience and Sustainability

The resilience of an infrastructure system refers to its ability to maintain and recover functionality in the face of stresses and shocks, whether these can be anticipated or not. There are no universal standards for measuring resilience, although it has been suggested that sustainability criteria can be used as a proxy for assessment of resilience (Table 2.2). The sustainability of an infrastructural system refers to its ability to meet service needs in a manner that does not make wasteful use of resources, minimises or reverses environmental damage and improves social equality.

Current infrastructure has generally been designed based on past climatic trends, which presents significant risks to investors and long term operators for future climatic changes and variability. The planning of new infrastructure and the mitigation of potential damages to existing ones are of high priority for protecting the country's growing economy. In addition, strategies for preserving the integrity of natural ecosystems are essential for supporting livelihoods and increasing the resilience of coastal communities.

Table 2.2: Characteristics of a resilient and sustainable infrastructural system²⁸

RESILIENCE	SUSTAINABILITY
Cognisant of change and uncertainty	Preserve natural capital, including diversity
Robust and designed to anticipate potential failures	Reduce environmental impact(s)
Flexible and adaptable to changing circumstances	Increase service value
Resourceful in order to maintain or restore functionality when facing shock or stress	Advance social inclusiveness and equality
Include redundancy, i.e. building spare capacity to support continuity and accommodate pressures and changes in demand	Promote transparency and accountability
Inclusive and broad in scope to favour social	Strengthen human and labour rights and improve

²⁸ SuRe® The Standard for Sustainable and Resilient Infrastructure v 0.3 July 2016 http://www.gib-foundation.org/content/uploads/2012/06/20160727_SuRe%C2%AE_v_0.3_final.pdf

acceptance	working conditions
Integrated with other societal systems to support the achievement of common outcomes	

2.3.2 Actions for Resilience

In line with the Government of Ghana's vision of ensuring a climate-resilient and climate compatible economy ²⁹, the vision of this document is to enhance resilience in built infrastructure and natural ecosystems towards protecting the nation's assets and communities in a variable and changing climate.

Based on principles outlined in key international conventions and standards, as well as also meeting critical aims and objectives of sustainable national development programmes, five priority areas (Table 2.3) have been developed for addressing climate change, disaster risk reduction and environmental sustainability in Ghana. In most cases, each action as outlined in the Table 2.3 below is relevant across various traditional sectors.

Table 2.3: The five priority actions for obtaining climate resilience, disaster risk reduction and environmental sustainability

PRIORITY	ACTION
1	Improved quality and access to information
2	Strengthened institutional and individual capacity • Governance, institutional and individual capacity, and training • Research and development
3	Increased resilience of built and natural infrastructure • Resilience of infrastructure, disaster response and management, and marine and coastal management • Resilient land use, rural and urban planning; landscape and green space management; and alternative energy
4	Integration of resilience in sectoral planning and budgeting processes • Resilient agricultural systems • Water and sanitation • Health • Strengthened social services • Gender empowerment
5	Resilient principles incorporated into National Investment Strategies and Plans • Financial support, insurance and incentive schemes • Livelihood diversification and risk transfer

Source: Author's Construct (2017)

Priority 1: Improved quality and access to information

Effective communication is essential for sharing key messages and ensuring full participation by all stakeholders, especially the general public. Appropriate communication strategies and channels for raising awareness on climate change at all levels are critical for achieving policy objectives. For many sectors and cross-cutting programmes linked to climate change and environmental sustainability, improving the quality of data; access to data; gathering, sharing and translation of the data; and addressing the challenges of information and data form key approaches to increasing the resilience and coping capacity of institutions and communities. Policy actions for information should include strategies that target improvement in knowledge, information management, surveillance, and early warning systems for public institutions, including all levels of educational facilities, and local communities.

²⁹ Government of Ghana (2014) Ghana's National Climate Change Policy, MESTI, Accra.

Priority 2: Strengthened institutional and individual capacity

Governance, building institutional and individual capacity, and training: The combined impacts of climate change and environmental degradation present new challenges to existing capacities of institutions and individuals to respond adequately. Governance and capacity building are two key pillars of Ghana's National Climate Change Policy for coordinating and establishing clear roles and responsibilities of the various organisations and stakeholders to enhance institutional synergies and minimise conflict. Increased access to training programmes by individuals, especially those that belong to vulnerable groups, will ensure full participation in climate change initiatives. Policy actions that support governance mechanisms, especially those for attaining compliance to regulations and laws by the general public are essential for achieving national resilience goals.

Research and development: To support capacity building, there is the need for strengthening technological research in academic and research institutions. In Ghana, there is limited research in climatic and meteorological sciences, especially in the downscaling of models and scenarios. Policy actions to enable researchers undertake rigorous climate-related studies, in combination with participatory engagement processes with local stakeholders who have access to local knowledge, will provide improved projections on possible impacts for various sectors of the environment and inform suitable climate resilient strategies, planning and practices.

Priority 3: Increased resilience of built and natural infrastructure

Resilience of built infrastructure, disaster response and management, and marine and coastal management: Infrastructure can be impacted directly by climate related incidents such as floods, droughts, windstorms and other extreme events; indirectly where infrastructure is not climate-proof and consequently unable to withstand additional climatic stresses; or may become ineffective due to increased demands, such as for energy or water flows for hydropower. The vulnerability of communities also varies with spatial and social differentiation, and as such will have different impacts on homes and settlements. National strategies should ensure that key public infrastructures are able to withstand the impacts of future climate change and variability.

Resilient land use, rural and urban planning; landscape and green space management; and alternative energy: The resilience of natural ecosystems to climate change is critical for sustaining the livelihood of communities, especially in rural areas. Maintaining the integrity of ecosystems and services that generate food, income, medicine and foreign exchange for local communities can be achieved through appropriate strategies to protect natural resources include the implementation and enforcement of land use regulations to ensure environmental considerations for sustainable use and conservation of natural resources, and more effective land use plans to control land degradation, reduce soil loss and minimise siltation of water bodies.

Priority 4: Integration of resilience and disaster risk reduction into key national sectors

Enhancing a country's resilience requires the identification of essential services that always need to function, especially during emergencies. To minimise the risks and vulnerabilities of the population, resilience and risk management need to be integrated into sectoral planning processes. Key sectors identified include the following:

Resilient agricultural systems: Agricultural and food production systems are mainly extensive and reliant on natural resources, including hunting, and fishing from natural

aquatic systems. Over the years, plans for agricultural development have focused on increasing productivity and production. National policies and plans need to focus on more resilient crop and livestock systems, as well as address critical factors along the agriculture value chain, such as improved access to markets and post-harvest loss management.

Water and sanitation: Water availability, mainly dependent on groundwater resources (for the rural population) and surface water sources (for urban communities), is being challenged by inadequate water systems that are unable to meet the demands of a rapidly growing population and pollution from poor sanitation practices. With rainfall variability, the reduced quantity and quality of available water will compromise health of vulnerable communities. Strategies should be geared towards the management of water resources to enhance productivity and livelihoods. Proposed strategies for water conservation and irrigation systems facilitate the control of water storage facilities at various scales (from small local dams to large scale dams) to improve water security and increase climate resilience.

Health: In recognition of the direct and indirect impacts on human health and the additional challenges that climate-related events will place on the health care systems, policy strategies should focus on increasing and strengthening health facilities and equipment to ensure equitable access and affordable social services for all. Maintaining public health requires that preventive action is developed based on information on the risks and vulnerabilities of various social groups, as well as preparatory strategies to ensure that appropriate interventions are available when extreme events threaten the health of communities.

Strengthened social services: The capacity of different social groups to adapt to climate change depends on a range of physical, socio-economic and technological conditions which results in disparities in climate change adaptation outcomes. To disaggregate these, policy actions should highlight the inclusion of gender in all sectoral planning, improved access to social services, the provision of alternative sustainable livelihoods, and the provision of social protection and social safety nets, as essential elements for building the resilience of vulnerable communities.

Gender empowerment: To empower women and vulnerable individuals, policy actions generally call for the participation of women in decision making processes (including the use of indigenous knowledge) in various sectors including wildlife management, water resource management and sanitation, and energy; training women to complement extension service delivery; and improving land tenure rights on long term basis to benefit women.

Priority 5: Resilient principles incorporated into National Investment Strategies and Plans

Financial Support, Insurance and Incentive Schemes: The country will need to rely on a mix of international and domestic sources, as well as public and private investments by developing strategies that encourage the financing of resilience actions, disaster risk management plans and environmental sustainability activities. Stakeholders will need to be supported and encouraged to be innovative in their adaptation efforts. Investment and insurance sectors can promote climate resilience, reducing the risk of damage and securing rates of return.

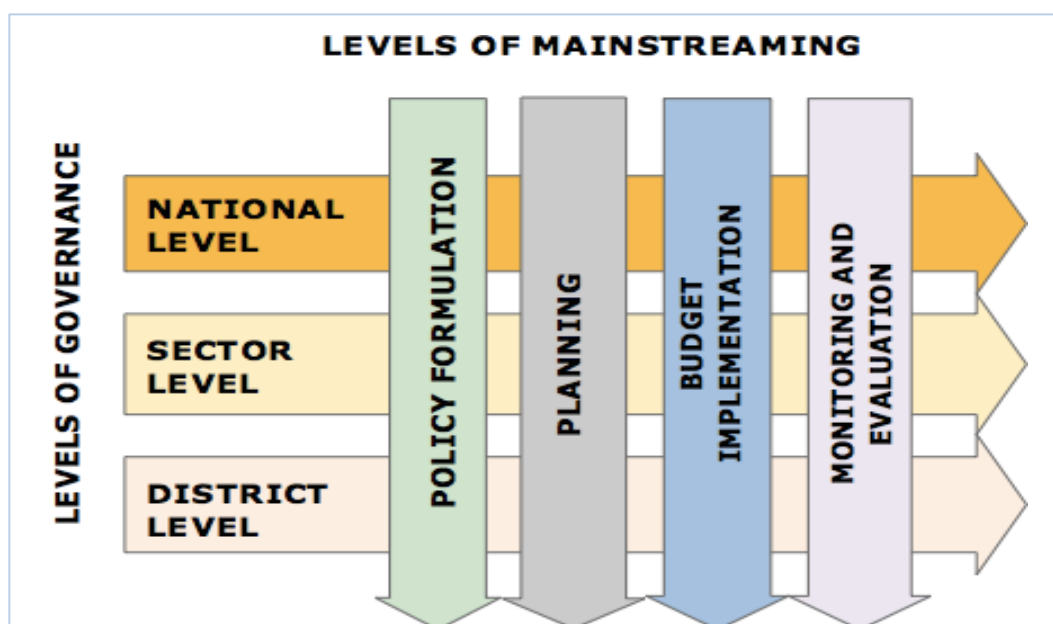
Livelihood diversification and risk transfer: The provision of alternative sustainable activities to support livelihood needs of those who depend mainly on natural resources

increases resilience to potential climate-related risks and impacts. This includes numerous strategies to promote local enterprises and support the acquisition of skills in alternative livelihoods that can improve incomes and reduce pressure on natural resources.

2.3.3 Integrating Resilience into Development Planning

The NDPC has recognised the need for strategically integrating adaptation and mitigation responses into existing policies, plans and programmes to reduce potential impacts of climate change on national development, as well as take advantage of new opportunities. This integration, or mainstreaming, follows the national development planning and budgeting processes (Figure 2.6). Mainstreaming is effective when incorporated into all levels of climate planning (e.g., policies, laws, standards, institutions, technologies, funding mechanisms, etc.) and at the different stages of implementation (i.e., conceptualization and identification, design, appraisal, implementation, monitoring and evaluation)³⁰.

Figure 2.6: Mainstreaming at different levels of governance



Source: NDPC, 2010

Ghana's Mainstreaming Process

The various steps to achieve mainstreaming of climate resilience and disaster risk reduction strategies into the national budget, Medium Term Expenditure Framework and MMDAs development plans, has been defined in a Guidebook³¹. The guidebook aims to assist districts to implement actions that enhance adaptive capacity and reduce vulnerabilities such that relevant climate strategies become part of, or is consistent with, well established programmes.

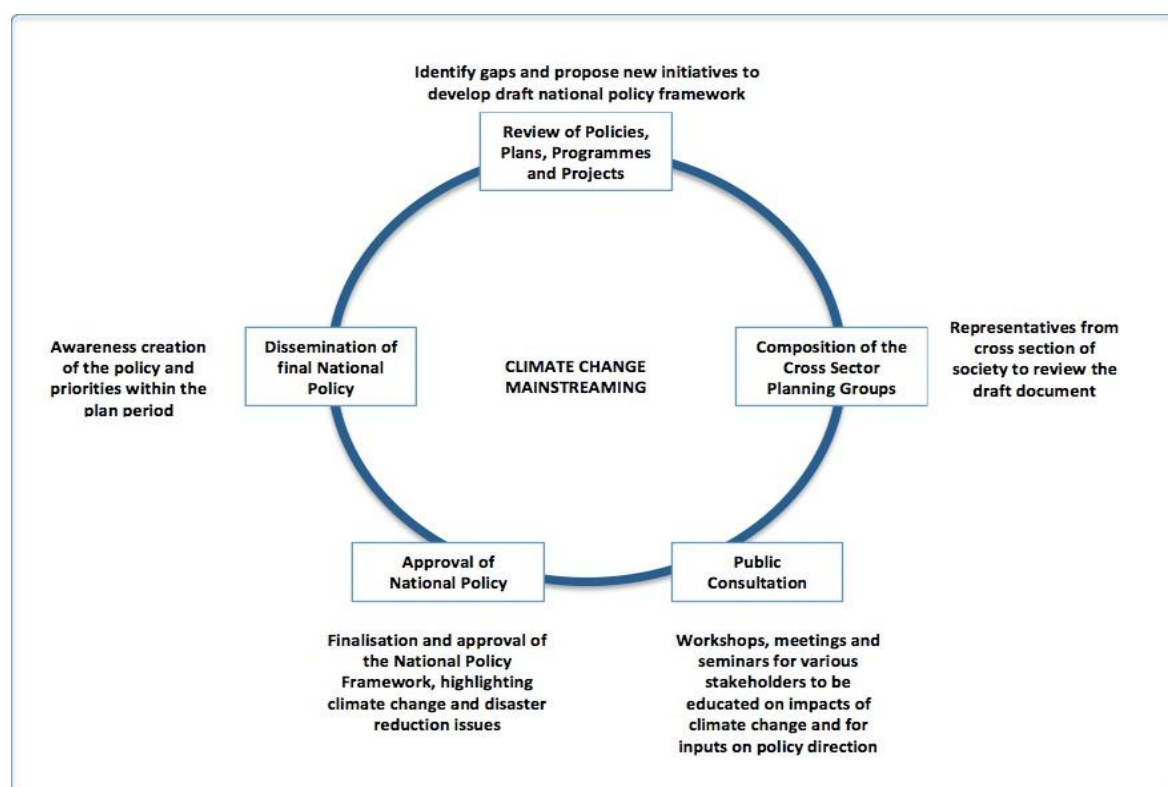
³⁰ National Development Planning Commission (2010) Guidebook on Integrating Climate Change and Disaster Risk into National Development, Policies and Planning in Ghana, NDPC, Accra

³¹ Guidebook on Integrating Climate Change and Disaster Risk into National Development, Policies and Planning in Ghana (2010), National Development Planning Commission, Accra

The development of a national policy initially begins with a review of existing policies, plans, programmes and projects to identify gaps and propose new initiatives, followed by review and validation processes (Figure 2.7). Once the national policy framework has been prepared, it is then translated into planning guidelines for the MDAs and the Metropolitan, Municipal and District Assemblies (MMDAs) in their preparation of plans and programmes at the sector and district levels, respectively. The NDPC works in close collaboration with the key agencies such as the Ministry of Finance and sector ministries, especially MESTI, to ensure that each sector and district plan accordingly reflects issues of climate change and disaster risk issues.

It is important to include, from the outset, effective negotiation and communication on the need for climate resilience with high decision makers such as Council of State, Parliamentarians, Ministers of State and Regional Ministers, District Chief Executives and National House of Chiefs.

Figure 2.7: Steps for mainstreaming of climate change and disaster risk reduction into national policy and planning process



Source: Adapted from NDPC, 2010

Towards Effective Mainstreaming

To aid in the effective mainstreaming, development planners need to assess and characterise the mainstreaming status and then integrate climate resilience into development planning, while addressing specific challenges posed by climate change (Table 2.4). Programmes can be prioritised based on impacts, social needs assessments, and available funding and estimated costs. Participatory approaches are also encouraged for programme identification, policy formulation, and project planning,

costing and implementation. Finally, there should be timely access to benefits of programmes by target groups.

Another important component to the mainstreaming process is to find relevant entry points, i.e. identify opportunities in the national, sector or project planning process where climate considerations can be best integrated. The main categories of policy responses³² include:

- i. Climate-proofing approach – climate resilience is integrated at a later stage of design to minimise impacts of climate change on the intervention
- ii. Climate-first approach – climate resilient strategies are identified and implemented through projects with effective pilots subsequently being scaled up and or integrated into existing programmes, sectoral and national plans at a later stage
- iii. Development-first approach – climate resilience is an integral part of the development planning process from the beginning.

Table 2.4: Examples of assessment questions for characterising mainstreaming status for development planning³³

COMPONENTS OF FRAMEWORK		EXAMPLES OF ASSESSMENT QUESTIONS
Enabling Environment	Political will	• Whose political will is it (e.g. politicians; technocrats; donor partners)? • What is political will responsive to (e.g. UNFCCC; parliamentary debate)?
	Access to information	• What sources of information are available to support decision making? • Is there a national system for generating climate information? • Is there information to help planners deal with uncertainty?
Policy and Planning	Policy framework	• How is climate change reflected in policy? • Has climate change been integrated into any planning cycles? Which ones?
	Institutional arrangements	• Have institutional arrangements been put in place to mainstream climate change into development planning? • Have existing institutional arrangements been mapped out to enable effective division of responsibility within the decision-making process? • Have institutional arrangements been made sustainable? How?
	Financial framework	• How have climate change interventions have been costed and integrated into national development priorities and budgets? • Is there a resource mobilisation strategy in place to develop and implement stated climate-resilient policy objectives? • How does the management of climate funds support the articulation and implementation of integrated climate-resilient development objectives?
Programmes and projects		• How do projects or programmes climate-proof existing development? • How could projects and programmes potentially be integrated into national, local or sectoral development programmes? • How do projects or programmes have the potential to deliver climate resilience at scale?

2.4 Tools for Sustainability

Two formal tools are required to provide structured approaches for mainstreaming environmental information as part of decision making and developmental processes – Strategic Environment Assessment (SEA) and Environmental Impact Assessment (EIA). Essentially, SEA focuses on actions at the decision making level, such as new or amended laws, policies, programmes and plans, and EIA on specific proposed physical development projects such as highways, power stations, water resources.

³² OECD (2015) Climate Change Risks and Adaptation: Linking Policy and Economics. OECD Publishing, Paris

³³ Pervin, M., Sultana, S., Phirum, A., Camara, I.F., Nzau, V.M., Phonnasane, K., Kaur, N., and Anderson S. (2013) A framework for mainstreaming climate resilience into development planning. <http://pubs.iied.org/pdfs/10050IIED.pdf>

Strategic Environment Assessment

The SEA mainstreams environment³⁴ into sustainable development planning through prescribed processes and procedures (Table 2.5). It explores the environmental implications of national policies, plans or programmes (PPPs) before adoption such that alternative strategies are considered and relevant stakeholders are involved in the decision process. The consultation and broad stakeholder participation in the evaluation of PPPs is critical to ensure that actions are strengthened and accepted by all levels of stakeholders. The value of SEA for strategic development planning, however, greatly depends on the competences of responsible authorities to maintain the process and act on the results.

Table 2.5: The SEA process, key tasks and outputs

STAGES	TASKS	OUTPUTS
1. Screening	Is SEA required?	Screening statement
2. Scoping	Set context and focus of SEA	Scoping report
3. Environmental Assessment	Analysis of environmental risks and opportunities, mitigation	Environmental report
4. Monitoring and evaluation	Monitoring indicators	Monitoring plan
5. Reporting	Advisory notes	SEA Report/Manual

Source: Author's Construct (2017)

Applying a climate lens in SEA may help to identify elements of national policies, plans or programmes (PPPs) that are sensitive to or at risk from climate change or whose viability may be affected by projected future conditions due to climate change (Figure 2.8).

Figure 2.8: Some Climate related considerations for the SEA process³⁵

ESTABLISHING CONTEXT	● What are the main climate trends, how are they being monitored, and how is information about trends and projections disseminated? ● What is the level of awareness of climate change and associated risks among planners and society, and what systems exist to increase awareness? ● Which groups will be most affected (both positively and negatively) by possible adaptation interventions?
IMPLEMENTATION	● Are climate change signals already apparent, and if so, do they affect social and economic development? ● What proportion of population is at significant risk from (i) existing climate hazards and (ii) projected climate risks and hazards ● What are the losses, and what is the impact on GDP, associated with existing climate hazards?
INFORMING AND INFLUENCING DECISION MAKERS	● How can information on climate change, its impacts, and appropriate adaptation responses be communicated to senior decision-makers within overarching and sectoral contexts? ● What additional measures are needed for improving communication infrastructure, and for training educators and media to understand and interpret information relevant to climate change?
MONITORING AND EVALUATION	● What tools and indicators might be used to assess adaptation measures in terms of development outcomes? ● Did any climatic event or trend affect the achievement of the PPPs' objectives? If so, had the SEA taken such risks into account? ● Did the SEA succeed in integrating into the national budget the financial needs for assessing and dealing with climate change risks?

³⁴ The term 'environment' used as per EPA Act 490 'includes natural resources, social, cultural and economic conditions and the institutional environment in which decisions are made'.

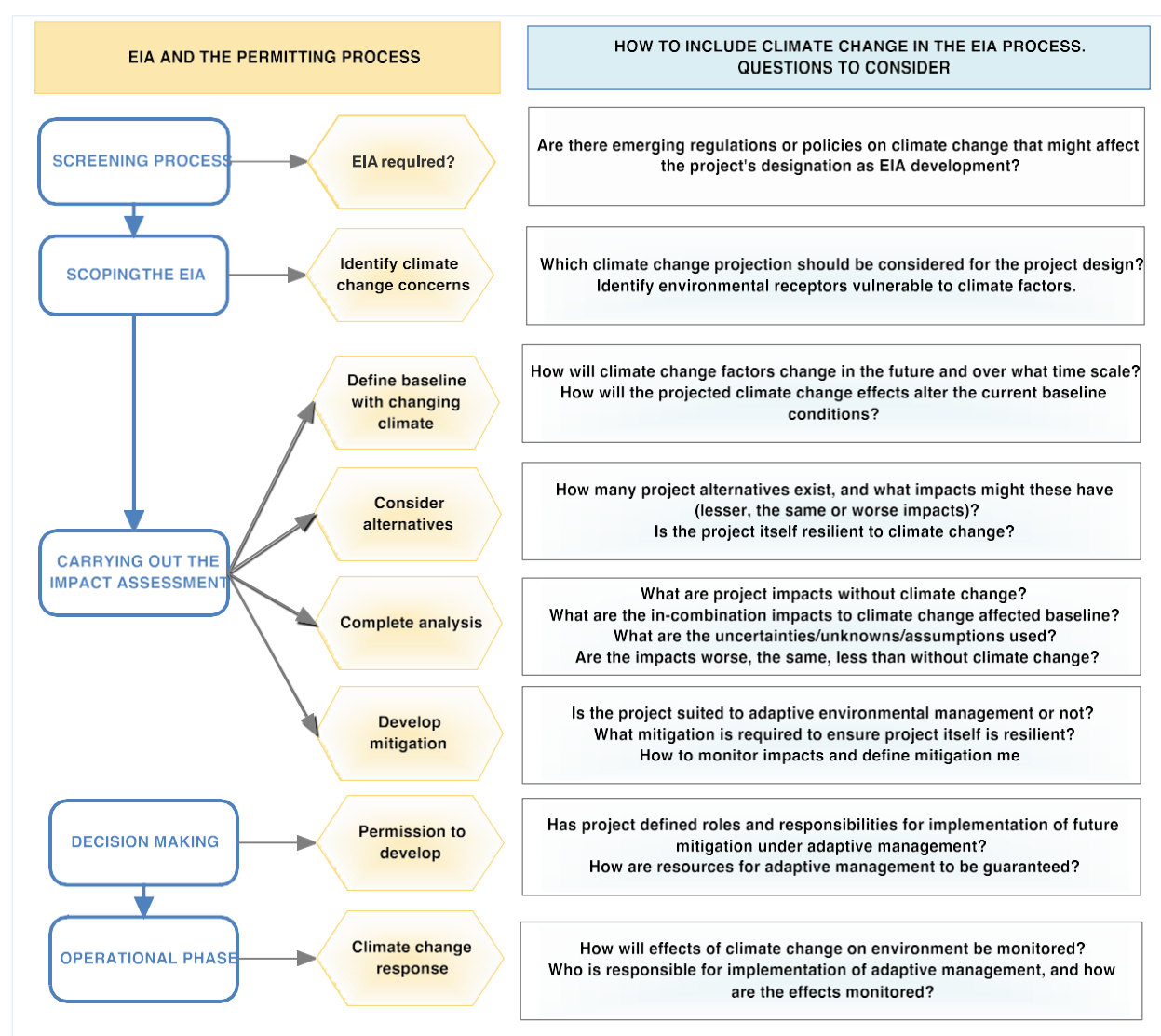
³⁵ More information can be found at OECD (2010) Strategic Environmental Assessment and Adaptation to Climate Change, DAC Network on Environment and Development Co-Operation (ENVIRONET), SEA Toolkit. http://content-ext.undp.org/aplaws_publications/1769217/SEA%20and%20Adaptation%20to%20CC%20full%20version.pdf

Environmental Impact Assessment

The EIA provides information on how the environment would be impacted as a result of the implementation of a project as well as promoting environmentally sound and sustainable developments. It therefore helps in determining whether or not a project should be implemented. EIA is an appraisal tool that is required by law under section 12 (1) of the EPA Act, 1994, Act 490, as part of planning and execution procedures of all development activities in order to promote environmentally sound and sustainable development³⁶.

Practitioners need to be guided in the effective consideration of climate change resilience into the EIA process, which will include how the project's resilience to climate change is considered, taking account of the knowledge base used in the impact assessment (Figure 2.9).

Figure 2.9: Considerations to be given at key stages of the EIA process for linking climate resilience³⁷



³⁶ More information is available at <http://www.eia.nl/en/countries/af/ghana/eia>

³⁷ Institute of Environmental Management and Assessment (2015) IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation, http://oldsite.iema.net/system/files/iema_guidance_documents_eia_climate_change_resilience_and_adaptation.pdf

2.5 Monitoring Process

Monitoring and Evaluation (M&E)³⁸ and Measuring, Reporting and Verification (MRV)³⁹ for climate change are important tools required for both reporting of future adaptation needs as well as the combined results of adaptation actions that have already been implemented, such as through INDCs. Many developing countries are still in the early stages of developing monitoring frameworks for climate actions, however, it is recommended that they can initially focus on:

- i. Prioritised climate risks identified through climate risk and vulnerability assessments to assess changes and evolution of the risks over time;
- ii. Adaptation activities outlined in national plan with targeted evaluation of key sectors using a range of evaluation techniques⁴⁰.

In addition, national audits can assess if public expenditure on adaptation is in line with international and national policy goals and has been spent in accordance with existing rules, regulations and principles of good governance. Monitoring reports also can be properly timed so as to coincide with planning and budgeting processes and can be used to inform subsequent plans/budgets.

2.6 Climate Funding

The mobilization of financial resources is critical for achieving Ghana's long term plan for infrastructural resilience and environmental sustainability. The NCCP estimated a total cost of US\$ 9.3 billion (GH¢ 35 billion) for implementing national climate programmes in the period 2015-2020⁴¹. In addition to domestic sources, the country can access more than 60 different types of climate funds at the international level, mainly through bilateral, multilateral and private sources⁴². Global funding opportunities include the Adaptation Fund and Global Climate Change Alliance. For Africa, examples of specific sources are the ClimDev Special Fund and the African Climate Change Fund both by the African Development Bank (AFDB), and Climate Change Fund under the New Economic Partnership for Africa's Development (NEPAD). The amount and availability of funds, however, varies depending on the criteria of the different funders⁴³.

A number of initiatives have supported the country's climate finance readiness to ensure the achievement of national accreditation status as well as establish effective finance systems. Ghana's participation in the Green Climate Fund (GCF) Readiness Programme, for example, has built capacity to enable direct or indirect access to the GCF, encourage

³⁸ Monitoring' and 'evaluation' are often used together, but they refer to separate tasks within an adaptation activity. Monitoring is ongoing and evaluation is periodic in nature and can be ex-ante, ex-post, or mid-term evaluation.

³⁹ MRV is primarily used to refer to national greenhouse gas inventories and mitigation actions with the aim of documenting emissions levels and reductions in the international political context.

⁴⁰ OECD (2015), Climate Change Risks and Adaptation: Linking Policy and Economic, OECD Publishing, Paris.

⁴¹ Government of Ghana (2016) Ghana National Climate Change Policy Action Programme for Implementation: 2015-2020, draft document, https://www.weadapt.org/sites/weadapt.org/files/ghana_master_plan_0.png

⁴² Climate Finance Options, (2013), World Bank, UNDP, climatefinanceoptions.org.

⁴³ For further information, consult online resources on: Climate Fund Inventory Database (OECD), Climate Funds Update, Climate Finance Landscape, Climate Finance Ready and German Climate Finance.

private sector engagement as well as develop national monitoring and tracking systems for effective finance management.

2.7 Way forward

Political commitment is essential towards planning and mobilising resources:

This is needed to implement actions for climate resilience, disaster risk reduction and environmental sustainability in Ghana. Although there are uncertainties in predicting specific impacts and there are no clear standards for measuring success in these actions, interventions need to be well targeted such that there will be no unintended social, economic, ecological or developmental outcomes. Dedicated action should be focused on addressing underlying disaster risk drivers, such as poverty and inequality. Political leadership is also critical for supporting institutional approaches in policy development, so that climate risks can be incorporated at the appropriate stages of the decision making process.

Policy makers need to actively engage with research processes:

In so doing, targeted and robust climate information will be obtained for evidence based decision making. Investing in climate research will contribute to the generation of improved data with higher levels of detail. All government ministries and agencies should consider the possible impacts of climate change and include additional resilience measures in their planning and budget processes. Agencies should also consider climate change when developing legal provisions and integrate it into standards, regulations and into government funding programmes where appropriate.

Local governments should ensure that their policies and investment decisions adequately reflect climate change risks:

Climatic impacts are mainly experienced at the local and regional levels. Local authorities should be empowered to work with and coordinate with local organisation and communities. The success of local initiatives, including the enforcement of building codes, planning decisions and the provision of emergency services, will be driven by the support of national governments to avoid conflicting requirements for infrastructure developers.

A multi-sectoral, multi-disciplinary approach is required for managing risks:

All sectors, with the involvement of the relevant institutions and stakeholders, should plan towards reviewing and periodically updating strategies that enhance infrastructural resilience and disaster preparedness and contingency into their policies, plans and programmes. Inter-sectoral linkages and collaboration will also need to be strengthened for effective climate action. It is recommended that short, medium and long term targets are developed for each sector as well as cross-sectoral actions, which should be guided by international and national climate commitments toward adaptation and mitigation.

The establishment of appropriate monitoring and evaluation processes:

Monitoring and Evaluation processes must be established across disciplines, sectors and the various levels of decision-making. This will ensure that the technical actions on the ground remain linked to policy directions. A well-established coordinating unit for climate resilient infrastructure development will ensure effective monitoring and keeping track of

the progress of programmes and projects; address various challenges and identify policy and financing solutions for all stakeholders.

Chapter 3 Construction Industry Development

3.1 Introduction

Globally in the 21st century, infrastructure is the lifeblood of prosperity and economic confidence. Successful delivery of well-planned infrastructure investments offers developing economies and for that matter Ghana, an opportunity to compete in the global marketplace. Construction is the mechanism through which infrastructure is delivered. The construction industry is important, plays a key role in Ghana's economy, and establishes the physical foundations and environment for its long-term development. Aside this key role, the contribution of the construction industry to the development of nations is summed up through its forward and backward linkages with other sectors and industries of the economy. By forward linkages, the output and products of the construction industry serve as inputs and raw materials for other industries. For instance, construction output, including all types and forms of infrastructure like buildings, roads and dams etc., are used as inputs by the financial, transport and energy sectors and industries. Backward linkage on the other hand relates to the growth in the industries that supply construction inputs —i.e. building technicians and professionals and manufacturing companies—to the construction industry.

Almost every economic activity is linked up with the construction industry. Consequently, the growth and development of any economy is directly or indirectly connected with the construction industry. Economic development cannot thus be achieved on the back of a fragile and ill-equipped construction industry. The construction industry is for the foregoing reasons considered an economic backbone and major contributor to the gross domestic product (GDP) of Ghana. For instance, its contribution to GDP has shown an increasing trend from 8.5 percent in 2010 to 11.8 percent in 2013; an indication of its growing importance in the development of the nation. This evidence notwithstanding, the construction industry in Ghana is substantially underdeveloped and plagued with numerous constraints.

3.1.1 The Global Construction Industry

The construction industry is the sector of national economy engaged in the preparation of land for construction, actual construction, alteration, and repair of buildings, roads and other infrastructure. It is traditionally divided into two main sub-sectors —building construction and civil engineering sub-sectors. The construction industry thus encompasses all the businesses involved in the building of residential or commercial property, highways, motorways, bridges, pipelines, telecommunications, sewers, water treatment systems, roads, subway tunnels and light rail transit lines among many other kinds of infrastructure. It incorporates the contractors, including sub-contractors and specialist contractors, consultants, researchers, skilled and unskilled operatives and other human resources engaged at the various stages in the project delivery process for building and civil engineering works and whose work enhances the building process.

3.2 The Ghanaian Construction Industry Context

3.2.1 Overview

The Ghanaian construction industry derives many of its practices from the British construction industry. It is the backbone of the Ghanaian economy and contributes between 8% and 12% to the overall gross domestic product (GDP). The industry is a major source of employment, with between 2 percent and 3 percent of the active population engaged in the industry. The Ministry of Works and Housing (MoWH), which is responsible for initial registration and classification of contractors, has more than 20,000 building contractors on its register. This is a relatively large number given the size of Ghana's economy. Data from MoWH puts the 2010 figure at about 34,000 registered contractors. Like the UK industry, from which the Ghanaian construction industry derives most of its practices, the Ghanaian construction industry presents few barriers to entry thus allowing individuals and business entities without the requisite qualifications, personnel, or resources to register as contractors.

The Ministries of Roads and Highways (MRH) and Works and Housing (MoWH) are responsible for the policies that affect Ghana's construction industry. Whilst the two ministries are responsible for the registration and classification of road and civil engineering contractors and building contractors respectively, neither ministry has a monitoring or regulatory function with respect to contractor performance. All Ghanaian construction firms register with the Registrar General's Department and have to submit annual returns. This is however not strictly enforced and there are no published sanctions for non-compliance.

A major feature of the Ghanaian construction environment is the separation between design and construction. Professionals tend to operate independently of each other with allegiance to their respective professional bodies such as the Ghana Institution of Architects (GIA), Ghana Institution of Engineers (GhIE) and Ghana Institution of Surveyors (GIS). The adversarial relationships which traditionally characterise the construction industry thus tend to be very prominent in the Ghanaian industry. There is a welcome development by way of recent efforts aimed at establishing a central agency responsible for regulating the industry. Whilst these efforts have not progressed as expected, it is anticipated that through co-ordinated action by industry stakeholders, the necessary processes leading to the establishment of an industry regulator will complete soon.

3.2.2 Performance Standards in the Ghanaian Construction Industry

At its best, the Ghanaian construction industry exhibits admirable excellence and has delivered quite a few landmark infrastructure projects. As far back as the 1950s, Ghanaian construction firms were involved in delivering some of the excellent post-independence infrastructure. However, such excellence appears too few and far between and is not replicated consistently throughout the industry. The inconsistency in delivery performance of the Ghanaian construction industry is a major cause of concern amongst client groups and other construction industry stakeholders. Failure to meet performance targets within the Ghanaian construction industry is a common shortcoming. Contractors are almost invariably blamed and criticised when there are problems with project

delivery. Contactors are sometimes perceived as deficient in the application of requisite management techniques and their performance is one of the weakest links and the cause of overall industry performance. This is by no means the only factor responsible for industry underperformance; there are many associated factors that undermine the industry's ability to deliver.

Undoubtedly, poor management and leadership of construction firms is a major cause of underperformance. It is not at all unusual for the larger indigenous Ghanaian contracting firms to be owned by proprietors who may have little or no formal knowledge of the construction industry, project management or organisational management. Such proprietors generally do not employ personnel with the technical know-how to manage their firms towards sustainable growth. Management of firms' resources is sometimes undertaken on an ad-hoc basis with no formalised organisational structures and therefore does not promote growth. The Ghanaian construction industry is a highly unstable business environment and is affected adversely by high inflationary trends. These trends negatively affect contractors' capital and make it increasingly difficult to manage construction firms in Ghana.

There is a general perception in Ghanaian society of widespread poor and subpar performance amongst Ghanaian contractors. A high incidence of construction-related accidents, coupled with a number of recent high profile building collapses leading to injuries and fatalities, has led to calls by the government and other stakeholders for contractors and construction industry professionals to emulate global best-practice and improve upon safety at construction sites. Widespread underperformance amongst Ghanaian contractors translates to a majority of local major projects being awarded to a few large firms which are mostly foreign owned or foreign backed. Both large and small contractors in Ghana find it difficult accessing finance for projects. Delays in the payment of contractors for work done are very common and constitute a major cause of hold-ups in the completion of projects. According to research, construction projects in Ghana record cost overruns of 60 percent to 180 percent on average and time overruns of between 12 months and 24 months. There is also a seeming lack of commitment towards the health and safety of Ghanaian construction workers who work in a generally unsafe environment. The effects of these and many other problems affecting Ghanaian contractors is that it is difficult to attract investment into Ghanaian construction firms. There are currently no listed construction companies on the Ghana stock exchange and there are no Ghanaian construction firms in the Ghana Club 100 ranking of prestigious companies which demonstrate excellence in performance. The performance of financial institutions, especially the domestic banks in the Ghana Club 100 rankings show that investments in technology and innovation enable local firms to take on and match foreign owned competitors.

Improvements in practices and processes are urgently needed to advance the overall performance of Ghanaian contractors. In this sense, the progress made in many countries including some African countries offer opportunities for the Ghanaian construction industry to learn from and improve performance. With the commencement of commercial oil exploration in Ghana, it is important that Ghanaian construction firms are able to consistently deliver excellence in both their products and services to their clients. This will enhance their capacity to compete with international companies and participate actively in the delivery of the large-scale infrastructural platforms associated with the exploration and delivery of oil and related products. In particular the Ghanaian

industry has to keep pace with rapid improvements, innovation and emerging trends in the global construction industry through the use of new techniques, emerging trends and new technologies. Urgent co-ordinated action involving all key stakeholders is required to bring the improvements needed. This report provides ideas for a major stimulus to the transformation process.

3.2.3 Skills Development in the Ghanaian Construction Industry

Ghana's construction industry can boast of many distinguished professionals such as engineers, architects, and quantity surveyors etc. who have been involved in the delivery of many landmark projects. Most of these professionals are trained locally at the Kwame Nkrumah University of Science and Technology (KNUST). In recent times, new institutions have emerged, increasing the numbers being trained. However, some concern has been raised over the calibre of students being trained in these new institutions. Problems with personnel are a major cause of underperformance in the construction industry and this affects all levels of human resources within the industry. Proprietors and managers of Ghanaian construction firms are described as not having the requisite knowledge of construction issues to enable effective management. Many of the larger indigenous construction firms do not employ professionals with the right training, skills and competencies for twenty-first century management of construction firms.

The training of skilled tradesmen may not be sufficient to enable them to produce excellence in projects. A large proportion of operatives, especially those in skilled trades, do not have a formal qualification in relation to their trade. There is also a perception that Ghana may not be producing the numbers of professionals for the construction industry that are able to sufficiently meet the needs of the growth and development of the Ghanaian economy. For example, with 839 registered architects at the end of 2016, Ghana has in excess of 33,000 inhabitants per architect. This ratio is very high compared to other countries with developed construction industries as shown in Table 3.1.

Table 3.1: Number of Persons per Architect for Selected Countries compared with Ghana⁴⁴

Country	Total Number of Architects	Number of Persons per Architect
China	33,750	40,000
Romania	5,580	3,827
Slovakia	1, 600	3,378
Czech Republic	3,300	3,183
Poland	13,700	2,789
Bulgaria	2,900	2,527
Brazil	80,000	2,500
Hungary	4,000	2,491
Latvia	900	2,269
Estonia	600	2,233
France	29,900	2,187
Lithuania	1,500	2,133
Croatia	2,250	1,955
United Kingdom	33,500	1,880
Turkey	40,600	1,840
Austria	4,600	1,835
Ireland	2,600	1,729
Finland	3,250	1,662
Sweden	5,800	1,567
Netherlands	10,680	1,567
Switzerland	5,380	1,478
Slovenia	1,400	1,468
Norway	3,600	1,385
USA	222,360	1,300
Bosnia & Herzegovina	3,000	1,280
Greece	16,400	988
Cyprus	900	958
Spain	51,000	906
Belgium	13,200	836
Germany	101,600	806
Denmark	7,200	775
Luxembourg	680	772
Portugal	14,000	688
Macedonia	3,000	687
Malta	650	646
Italy	147,000	414
Ghana	839	33,373

Source: Arch Daily, 2017 and Ghana Institute of Architects, 2017

With about 1,500 quantity surveyors in good standing at the end of 2016, there are more than 17,000 persons to 1 quantity surveyor, compared with 1,400 persons to 1 quantity surveyor in the UK. While in recent times, more educational institutions are offering training for construction professionals, the quality of training needs to be monitored to ensure it is in line with best-practice global trends. Further study needs to be undertaken to assess the quality and quantities of other professionals such as structural engineers, planners, services engineers, land surveyors etc. to ensure

⁴⁴ Arch Daily, 2017. Does Italy have way too many architects? Available at <http://www.archdaily.com/501477/does-italy-have-way-too-many-architects-the-ratio-of-architects-to-inhabitants-around-the-world>

sufficient numbers of quality professionals are being trained who are able to sustain Ghana's developmental and growth projections. New postgraduate courses such as the MSc. Procurement Management, MSc. Construction Management, and MSc. Project Management introduced by KNUST will help boost the capacity of managers in the construction industry.

In addition to quality graduate professionals, the quality of skilled and unskilled trades' operatives needs to be developed through a system that ensures that all operatives possess relevant trades' qualification and certification. Training institutions like the Centre for Technical, Vocational Education and Training (COTVET) can provide programmes leading to certification as well as continuing development opportunities for all operatives and artisans for all trades employed in the Ghanaian construction industry.

3.3 Factors affecting Ghanaian Construction Industry Outputs

The state of performance in the construction industry has been seen to be a major cause for concern. The starting point of the urgent action required to address the issues with performance in the Ghanaian industry is to develop a better appreciation of the factors that affect the industry's performance. Literature focussing on issues of performance in the Ghanaian construction industry were reviewed. Much of the literature reviewed showed consistency in the issues identified to affect performance in the Ghanaian industry. For example, the following problems have been identified to affect the performance of Ghanaian construction contracting and consultancy firms⁴⁵:

- i. The inability to secure adequate working capital;
- ii. Inadequate management;
- iii. Insufficient engineering capacity;
- iv. Poor workmanship.

Key challenges identified in other studies as affecting industry performance are as follows:

- i. Poor leadership and management of construction firms;
- ii. Poor access to credit;
- iii. Delays in payment from government and government agencies;
- iv. Cumbersome payment processes;
- v. Inability to compete in the competitive system of procurement;
- vi. Lack of capacity to compete with foreign owned firms;
- vii. Personnel issues, low workloads and bribery and corruption;

⁴⁵ Ofori, G. (2012). Developing the Construction Industry in Ghana: the case for a central agency. Working Paper, National University of Singapore.

- viii. Other factors established were: low technology, inadequate supervision of contracts, poor preparation for projects, revision of bills of quantities, politicisation of the contract bidding process, and lack of effective barriers to entry.

The factors identified from literature as affecting construction industry performance were compiled, scored and ranked. Fourteen (14) of the most recurrent factors from the scoring and ranking exercise were used to develop a questionnaire for a survey of Ghanaian construction firms.

3.4 Field Survey of Ghanaian Construction Firms

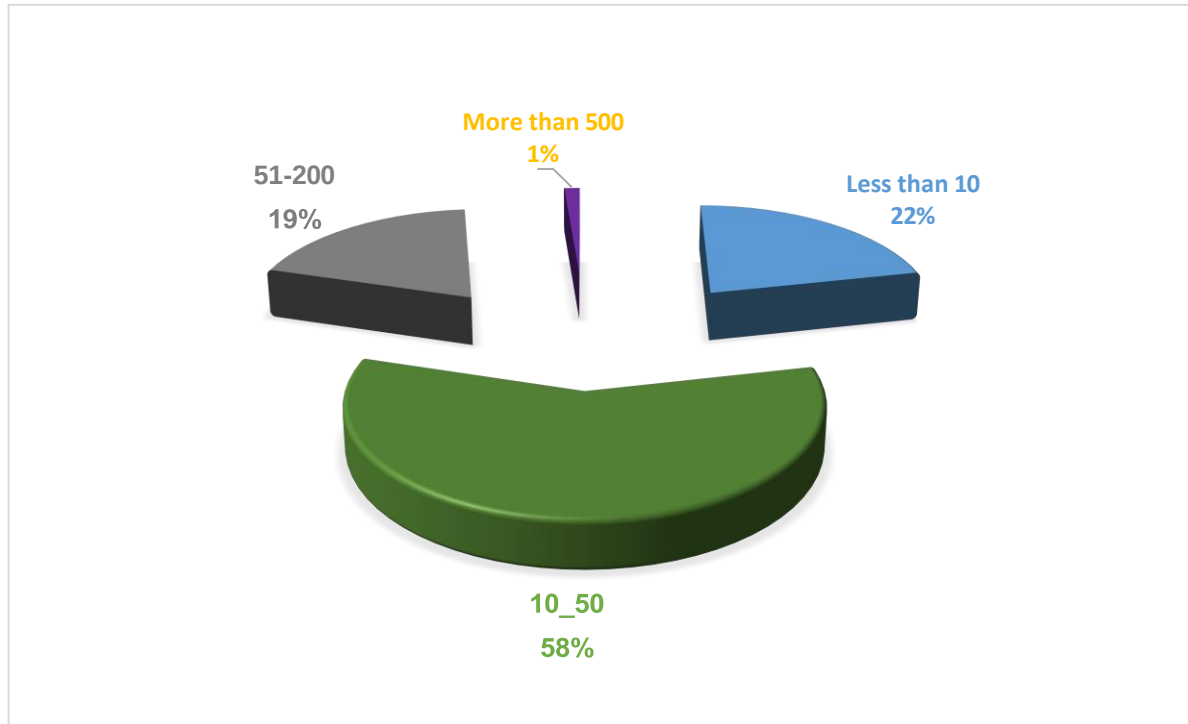
The field survey of construction firms focused on D1K1 construction contractors (large construction companies). Participants were selected randomly from lists provided by the MoWH and the Association of Building and Civil Engineering Contractors of Ghana (ABCECG). To reduce variability in the answers provided by respondents, answer options based on the literature study were provided in the research instrument used a structured questionnaire. In the next section, the results and key findings of the survey of Ghanaian contractors and financial institutions are presented, analysed and discussed. Of the 134 questionnaires sent out, the 79 returned represented 77 percent returns which is a very good returns rate ⁴⁶, possibly due to the high interest shown by respondent contractors both in the subject of the research and in the future findings.

3.4.1 Profile of Respondent Construction Firms

The relative sizes of the construction firms interviewed were determined based on their employee numbers. In terms of their employee numbers, the majority of respondent companies (57.5%) employed between 10 and 50 employees with only one of the 79 respondent companies employing more than 500 people (Fig. 3.1). This is a good representation of the profile of Ghanaian construction firms, most of which have small operations. The companies sampled showed a wide variation in the educational backgrounds of their employees with just about six of the respondent companies having employees with a university level qualification. While this does not necessarily reflect performance levels, the lack of university level graduates could impact management and administration in Ghanaian construction firms.

⁴⁶ Babbie, E, 2007. The Practice of Social Research. Belmont: Thompson Wadsworth

Figure 3.1: Employee numbers in respondent firms⁴⁷



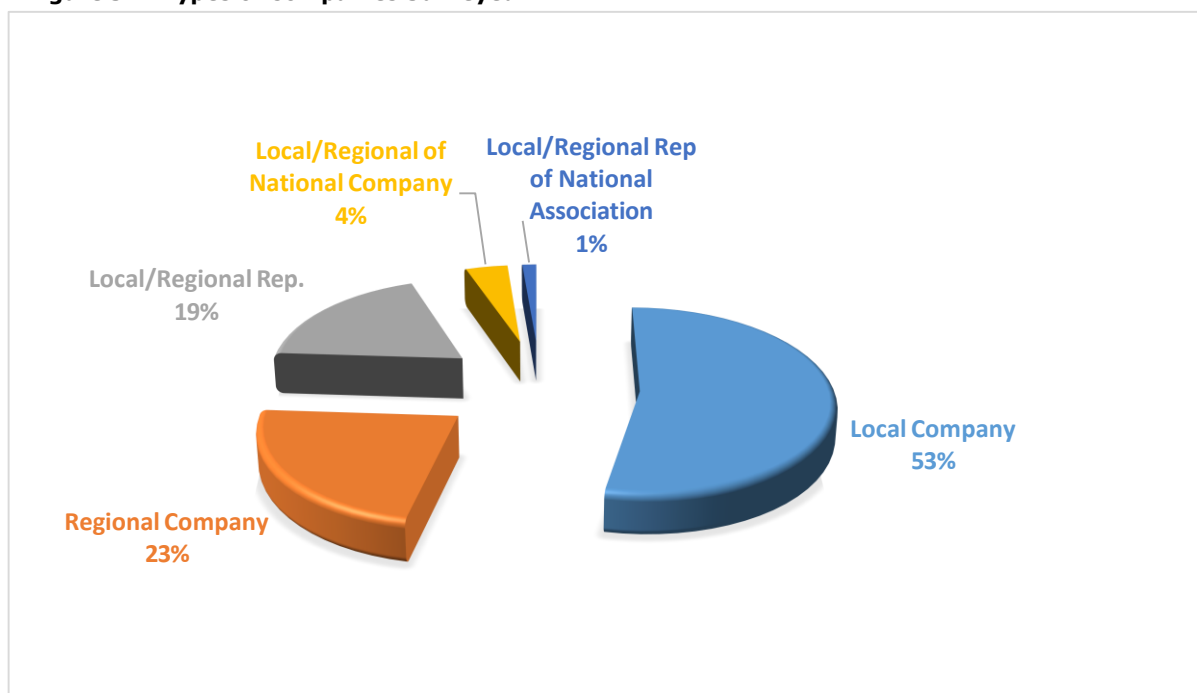
Source: Ofori-Kuragu, J.K., 2013

Out of the valid responses, 53.3 percent described themselves as “local companies”. Most Ghanaian construction firms operate within small geographical areas unlike UK construction firms which mostly have nationwide coverage with a significant number operating internationally. Some of the top UK contractors such as Vinci and Skanska are local representatives of multinational construction firms while some of the larger contractors such as Balfour Beatty and Taylor Wimpey are major players at the global level.

In Ghana, apart from a small number of foreign owned companies, contractors mainly operate within a particular town or city. About 22.7 percent of those surveyed described themselves as regional companies whilst 18.7 percent described themselves as the local representatives of a regional company and only 4 percent presented as the local or regional arm of a national construction company (Fig. 3.2).

⁴⁷ Ofori-Kuragu, J.K., 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

Figure 3.2: Types of Companies Surveyed ⁴⁸



Source: Ofori-Kuragu, J.K., 2013

3.4.2 Factors affecting Performance of Construction Firms – Survey Results

The study explored the factors which the respondents perceived to have an effect on the overall performance of Ghanaian construction companies. On a scale of 1 to 5, contractors were asked to rate 14 problems identified from literature as affecting the performance of Ghanaian construction firms. On the Likert Scale used, 1 was assumed to mean “no effect on performance” whilst 5 represents “seriously affects performance”. It is assumed that both 4 and 5 on the scale represent factors which have a significant effect on contractor and project success.

3.4.3 Results and Analysis

Following an exploration of past research and existing literature on the Ghanaian construction industry, the key factors affecting the performance of Ghanaian construction firms were identified. Thirteen (13) factors were identified using a ranking and scoring process for all factors identified from the literature review. Only frequently occurring factors — i.e. those cited in at least five different literature sources were included in the questionnaires. The fourteen factors are respectively: (i) poor access to credit, (ii) inability to compete with foreign owned firms, (iii) low technology available to construction firms, (iv) poor preparation for projects e.g. project planning and contracts awarded on the basis of political affiliation. Others are: (v) payment delays, (vi) cumbersome payment processes, (vii) inability to compete in competitive processes, (viii) personnel issues and (ix) low workloads. The rest are: (x) bribery and corruption,

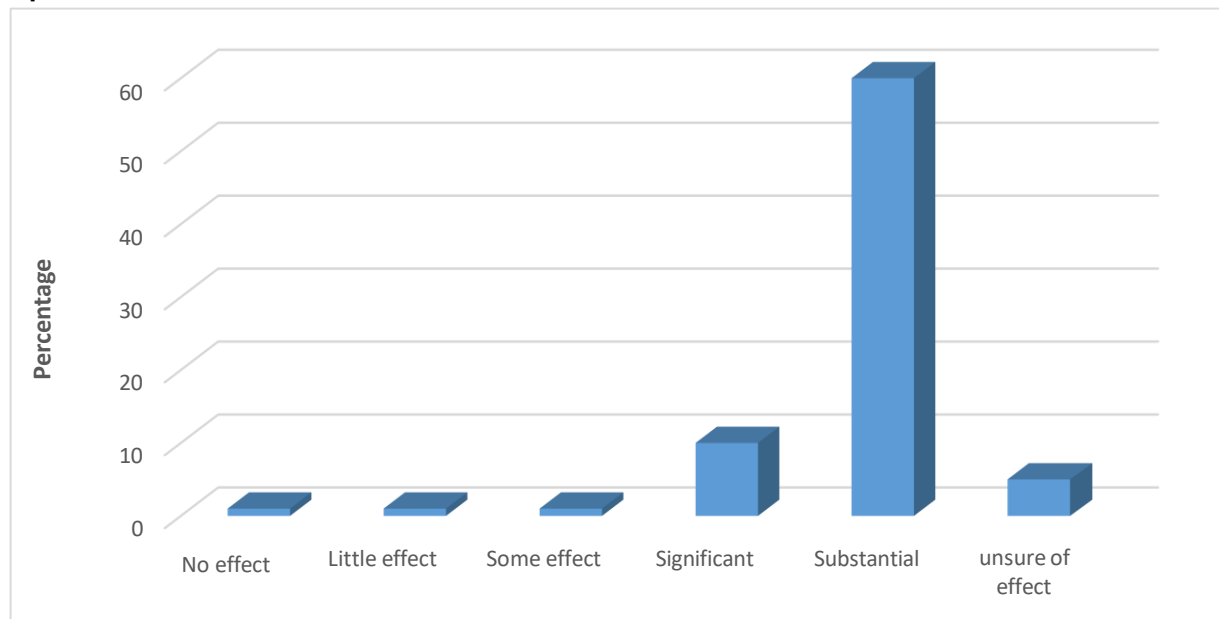
⁴⁸ Ofori-Kuragu, J.K., 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

(xi) inadequate supervision, (xii) revision of bills of quantities during implementation and (xiii) the ease of the processes involved in becoming a contractor are too easy.

Payment Delays

From the study, the strongest factor deemed by most respondent contractors as influencing contractor success was the delays relating to payments by the government or governmental agencies for completed projects, according to 88 percent of the respondents as illustrated in Fig. 3.3.

Figure 3.3: Effect of delay in payment by government agencies on construction firms' performance⁴⁹



Source: Ofori-Kuragu, J.K., 2013

The effect of long delays in paying contractors is that where loans are contracted to construct projects, accumulated interest will grow significantly and thus affect the overall profits of contractors, which in many cases are small to start with. Also high inflationary trends devalue both the prime cost and the profits made by contractors where there are protracted delays in paying contractors.

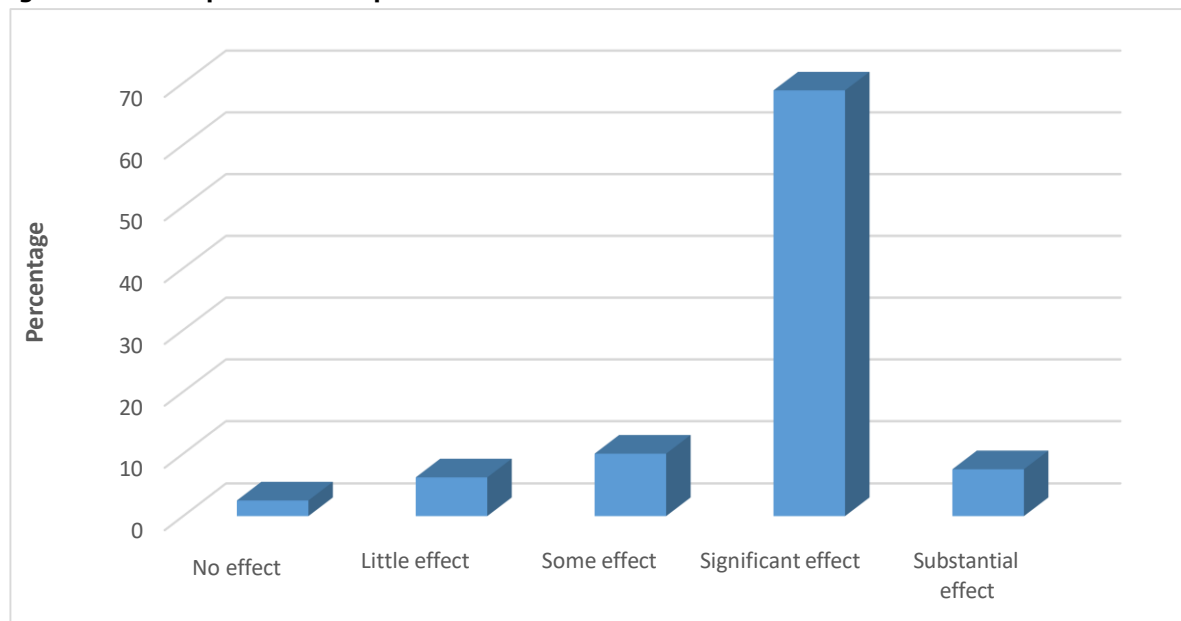
Perception that Contract Awards are based on Political Affiliation

Another significant factor arising from this survey is the perception that most public contracts were awarded on the basis of political affiliation, a position supported by 83 percent of respondents as illustrated in Fig. 3.4. This supports the generally widespread perceptions within the larger Ghanaian society that political affiliation is a major consideration in the award of public projects. Political influence in the procurement processes for public projects means that contractors who underperform or in some cases abandon projects after receiving advance mobilisation payments are able to win prestigious public projects in the future without due cognisance being considered of previous failings. Many contractors are unwilling to speak about this situation and

⁴⁹ Ofori-Kuragu, J.K., 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

successive governments do not demonstrate openness about contract awards or a willingness to address the situation.

Figure 3.4: Perceptions of how political affiliation affects contract awards⁵⁰



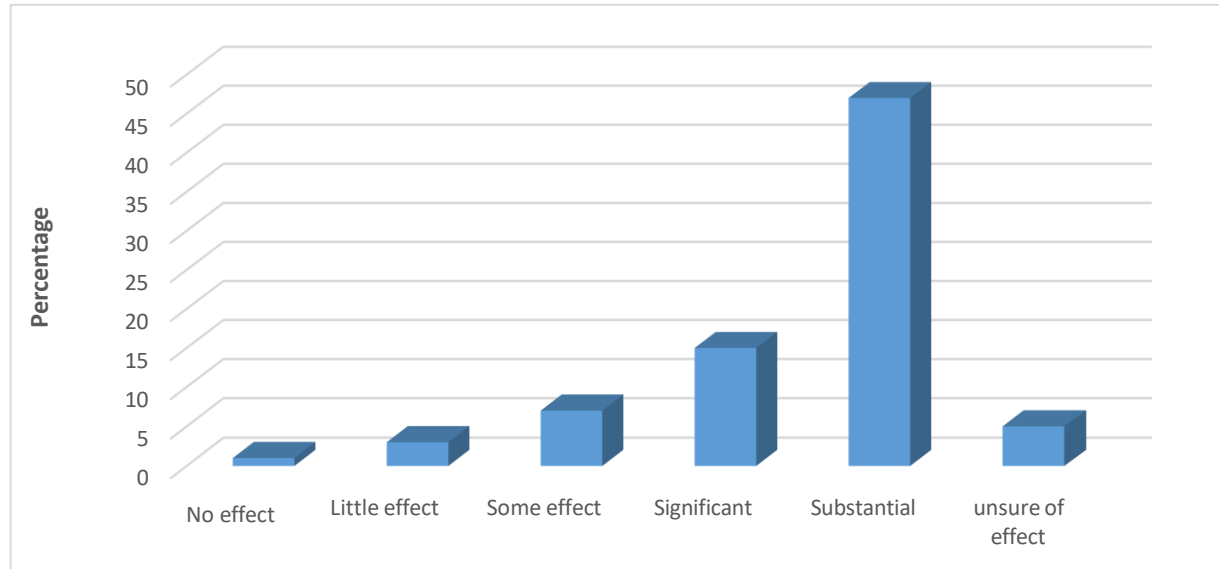
Source: Ofori-Kuragu, J.K. 2013

Lack of Capacity to compete with Foreign Firms

The study also reveals that the *lack of capacity to compete with foreign owned firms* affected the performance of Ghanaian contractors (Fig. 3.5). Laxity in the regulatory systems means that contractors may be able to register in high financial class categories without sufficiently demonstrating requisite financial capacity. Weak financial positions hamper their ability to meet capital eligibility criteria for high profile and sometimes the more profitable projects. Where poorly resourced contractors are awarded projects, they invariably experience cash flow problems.

⁵⁰ Ofori-Kuragu, J.K., 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

Figure 3.5: Perceptions of how lack of capacity to compete with foreign firms affects performance



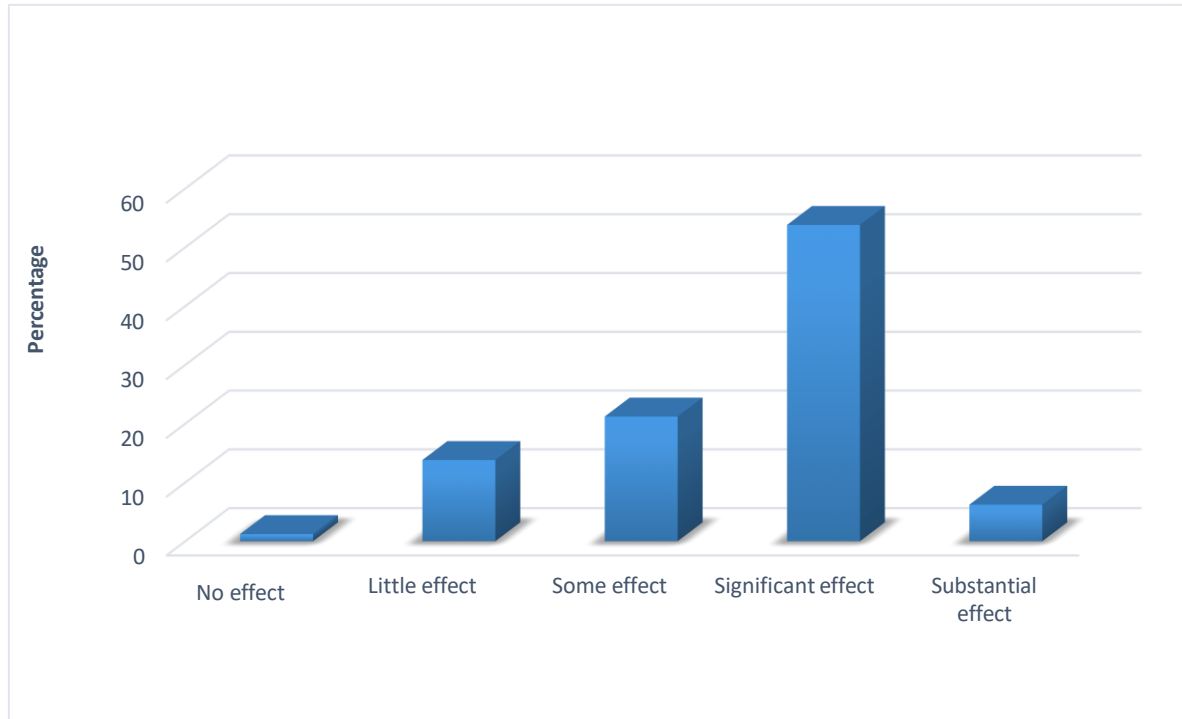
Source: Ofori-Kuragu, J.K. 2013

Perceptions of Bribery and Corruption in Ghanaian Construction Industry

The perception of bribery and corruption in the Ghanaian construction industry is very strong with 78 percent of respondents alluding to the significant effect the phenomenon has on the outputs of contractors and the overall performance of the industry (Fig. 3.6). It emerged during the interviews that political parties, their officials, and some public officials are in the majority of cases paid a percentage of the overall contract sum in public projects and that payment in some instances is demanded ahead of the formal start of the procurement process.

The study found that in many cases, contractors who pay or are willing to pay the illegitimate fee win contracts regardless of competence or the level of competition. This in many cases results in shoddy work as contractors inevitably lack the competence or financial muscle to achieve the levels of quality specified in project designs and specifications.

Figure 3.6: Effects of perception of corruption in construction industry on industry performance⁵¹



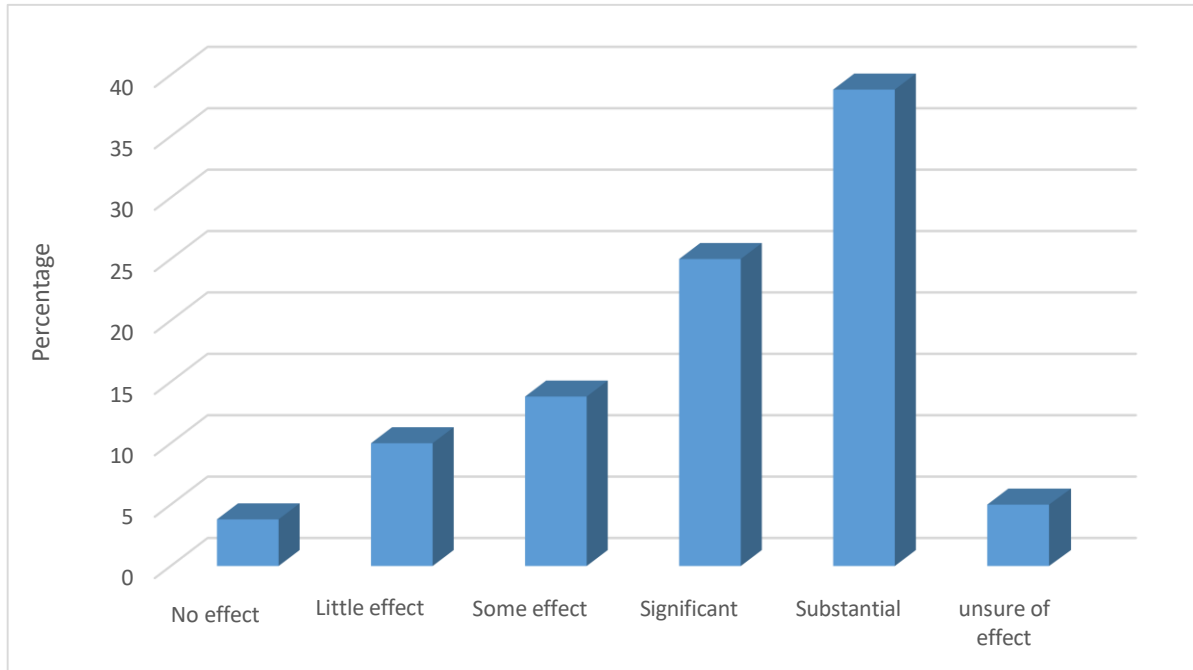
Source: Ofori-Kuragu, J.K. 2013

Low Levels of Technology employed in the Ghanaian Construction Industry

The impact of the level of technology available to contractors on their performance was explored. Nearly 64 percent of the valid responses identified *low technology available to contractors* as having a significant impact on the industry's performance as against 14 percent who do not see this as a major influence on performance (Fig. 3.7). Low levels of technology reflect low levels of mechanisation within the construction industry and a low utilisation of new and improved technologies easily available and in wide use in other countries. There is very little investment in research and development (R&D) as a deliberate strategy to improve levels of technology within the industry. Linkages between industry and academia have not been developed, and as a result outputs of the academic sector have not been harnessed to address the problems of the industry.

⁵¹ Ofori-Kuragu, J.K, 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

Figure 3.7: Perceptions of effect of low technology on contractor performance⁵²



Source: Ofori-Kuragu, J.K. 2013

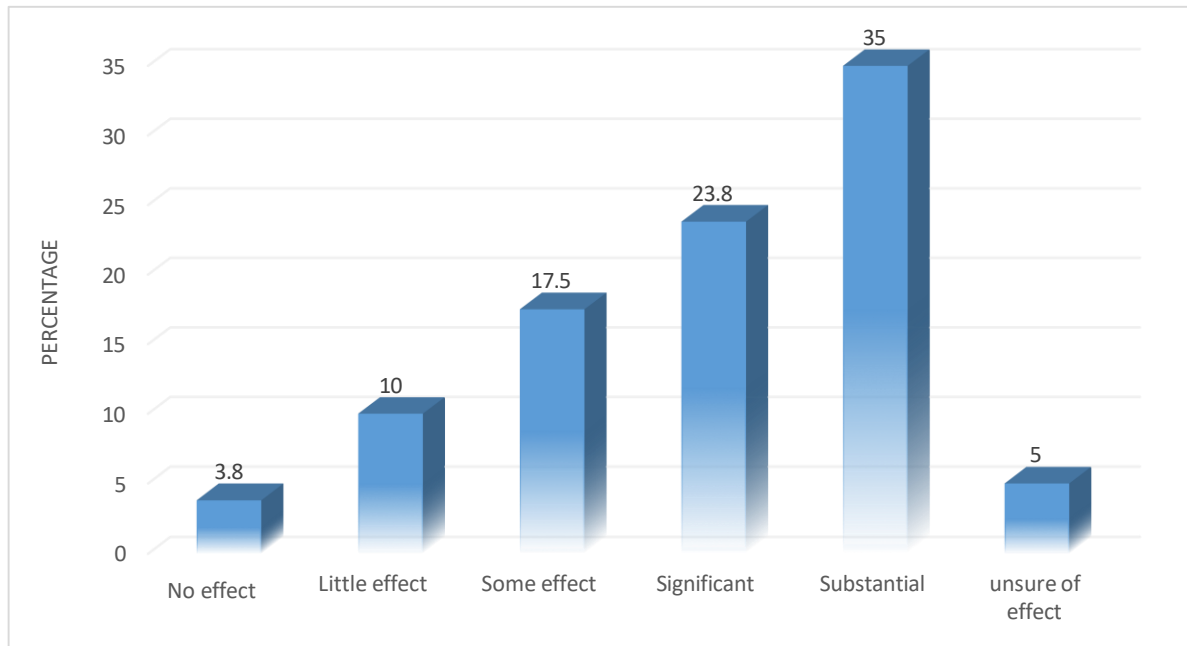
Poor Preparation of Projects

Poor preparation for projects such as a lack of effective project planning was also identified in the study as an important factor responsible for contractor underperformance. This position is supported by nearly 64 percent of valid responses with only 14 percent of those responding not supporting this position (Fig. 3.8).

This demonstrates awareness amongst the participating contractors of the essence of good project preparation. However, this awareness has not translated into improved project implementation preparation leading to a high incidence of project delays and cost overruns on many projects. Available project management software has not been exploited for the benefit of the industry.

⁵² Ofori-Kuragu, J.K, 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

Figure 3.8: Perceptions of effect of poor preparation of projects on contractor performance⁵³



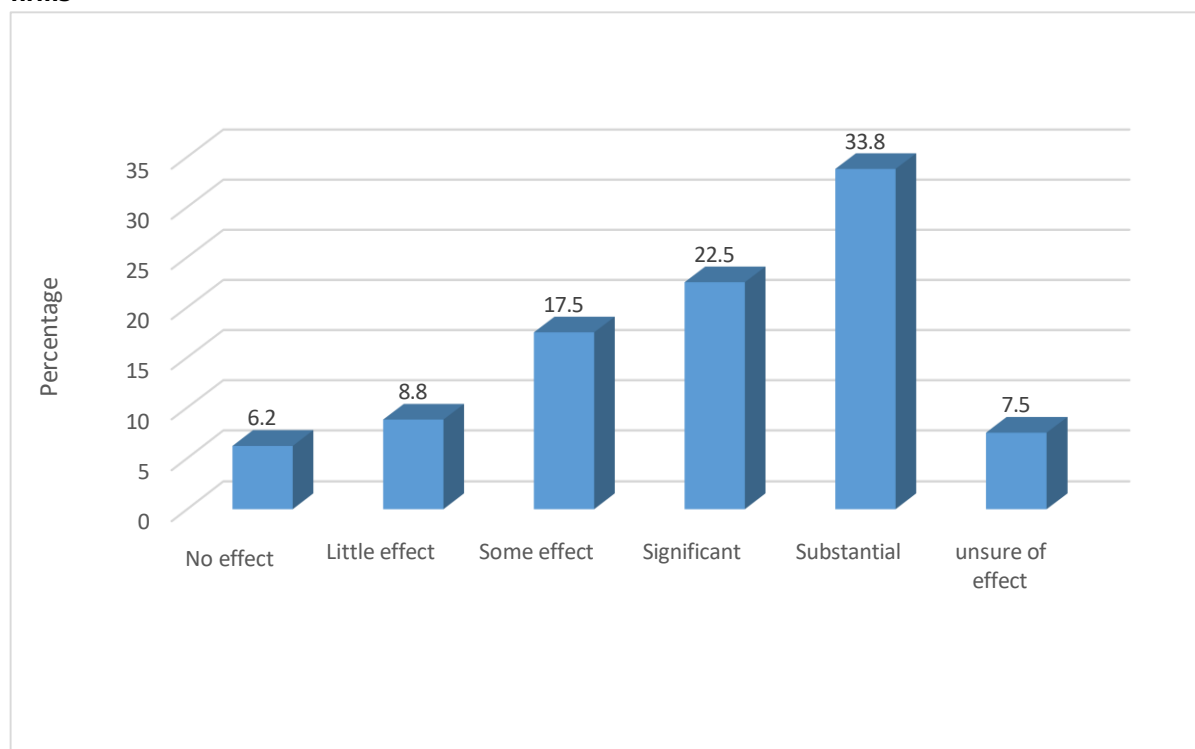
Source: Ofori-Kuragu, J.K. 2013

Inability of Ghanaian Contractors to Compete in Competitive Bidding Processes

Another factor which affects the performance of construction firms within the industry is the *inability to compete in competitive bidding processes*. Many of the high profile construction projects are won and executed by foreign owned construction firms. This may be due to the lack of expertise or other resources required to engage in tendering processes. This has implications for indigenous contractor workloads, their turnovers and profitability. It in turn affects the ability of Ghanaian construction firms to make the scale of investments which will improve their performance. The breakdown of respondents for how the inability to compete in competitive bidding is perceived to affect performance is shown in Fig. 3.9.

⁵³ Ofori-Kuragu, J.K, 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

Figure 3.9: Views on how inability to compete in competitive bidding affects Ghanaian Construction firms⁵⁴



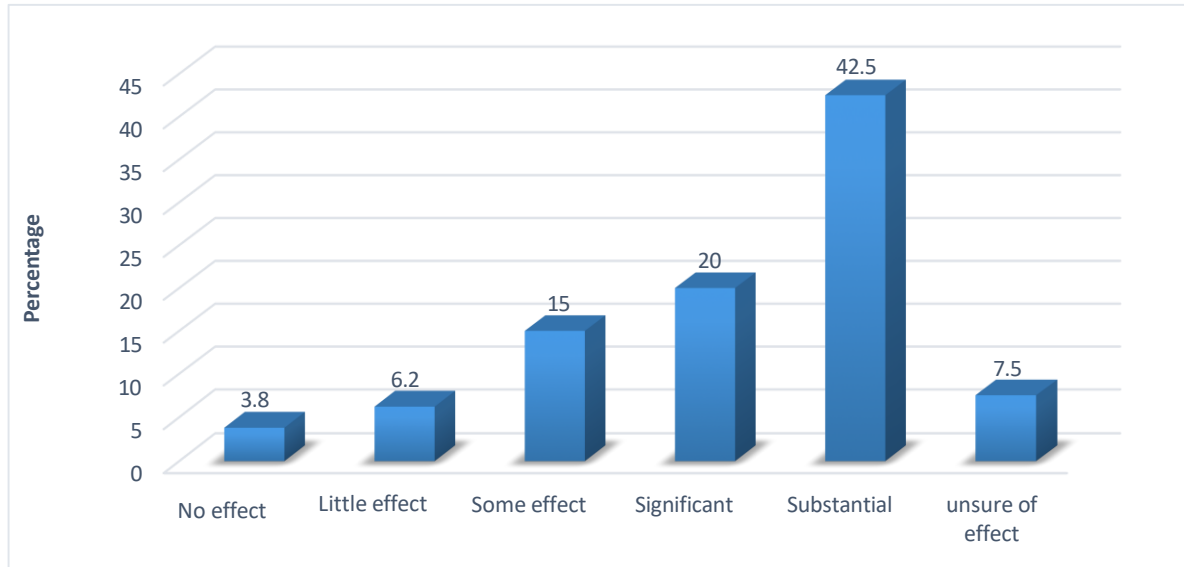
Source: Ofori-Kuragu, J.K. 2013

Poor Access to Credit by Contractors

One significant problem that affects construction performance is the difficulties associated with accessing credit for their projects. More than 65 percent of respondents perceived this to have a strong effect on contractor performance compared with less than 10 percent who did not see it as seriously affecting contractor performance. Fig. 3.10 illustrates a breakdown of respondents on the effects of credit on overall performance.

⁵⁴ Ofori-Kuragu, J.K., 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

Figure 3.10: Effect of poor access to credit on performance of construction firms⁵⁵



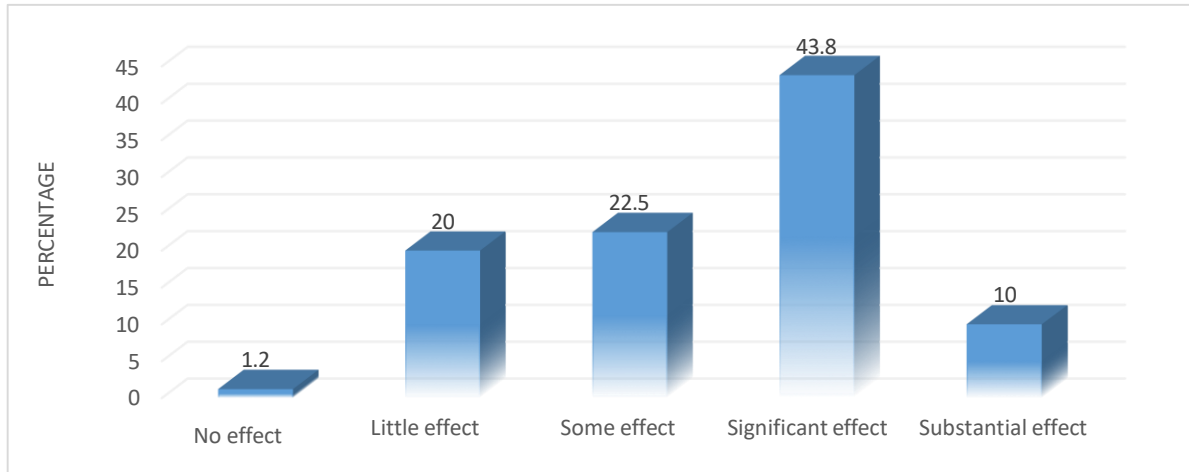
Source: Ofori-Kuragu, J.K. 2013

Cumbersome Payment Systems

As seen in the survey, most Ghanaian contractors are mainly reliant on government sources for projects. Most public projects are in turn facilitated by government departments and agencies. Awarding departments and agencies may consequently have to endorse completed projects before payments are sanctioned by the Ministry of Finance for payment to be made. Where projects are located in the regions, several visits may need to be made to Accra to process documentation before payments are received. Fig. 3.11 shows respondent views of how such cumbersome process relating to payment for work done affects overall performance.

⁵⁵ Ofori-Kuragu, J.K., 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

Figure 3.11: Effect of cumbersome payment systems on performance of construction firms⁵⁶

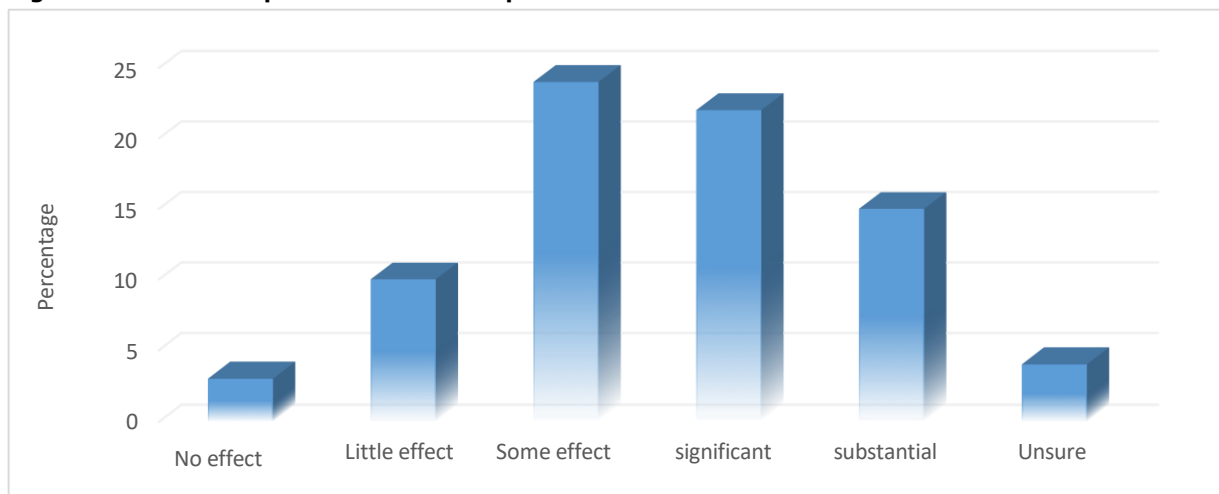


Source: Ofori-Kuragu, J.K. 2013

Personnel Issues

An incentivised and motivated workforce is very important to overall output within an organisation. It is therefore important that organisations focus on their people and their welfare as a means to improving organisational productivity. Fig. 3.12 shows the distribution amongst respondents of how personnel issues affect construction performance.

Figure 3.12: Effect of personnel issues on performance of construction firms



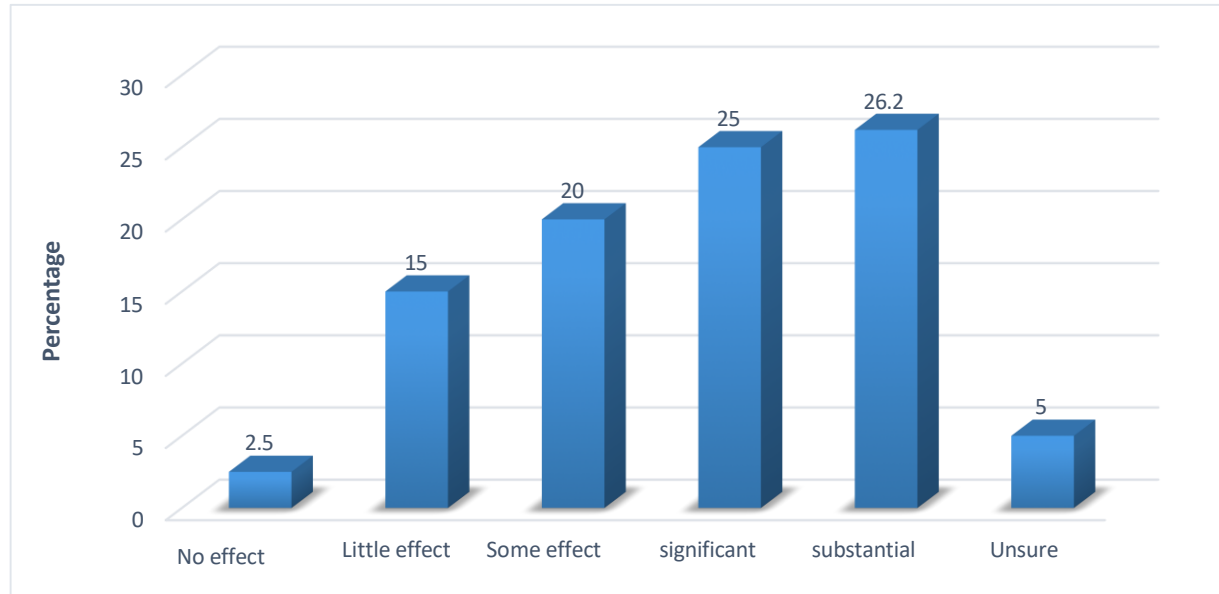
Source: Ofori-Kuragu, J.K. 2013

Inadequate Supervision

The quality and effectiveness of project supervision contributes greatly to project success. Inadequate supervision leads to poor quality which leads to losses arising from re-work and making good. Nearly 65 percent of the respondents agreed that the adequacy of supervision affects construction output as shown in Fig. 3.13.

⁵⁶ Ofori-Kuragu, J.K, 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

Figure 3.13: Effect of inadequate supervision on performance of construction firms

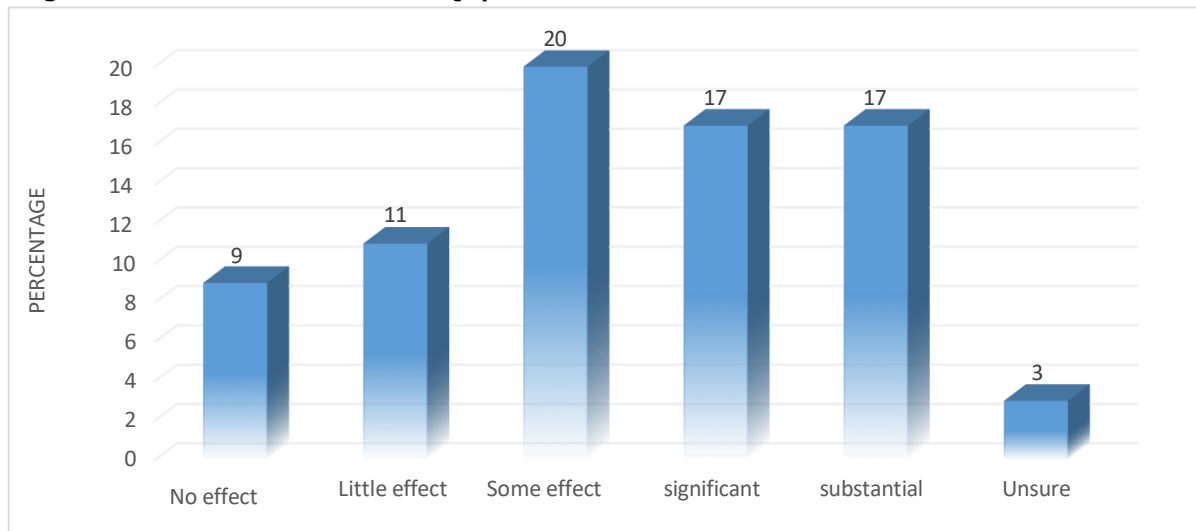


Source: Ofori-Kuragu, J.K. 2013

Revisions in Bills of Quantities

Revised bills of quantities arise from revisions in designs and may negatively impact on project costs and implementation. Taking additional care and effort can minimise the occurrence of such revisions. Fig. 3.14 shows the distribution of how respondent contractors perceive revisions in BOQs to affect overall project performance.

Figure 3.14: Effect of revision of BOQs performance of construction firms⁵⁷



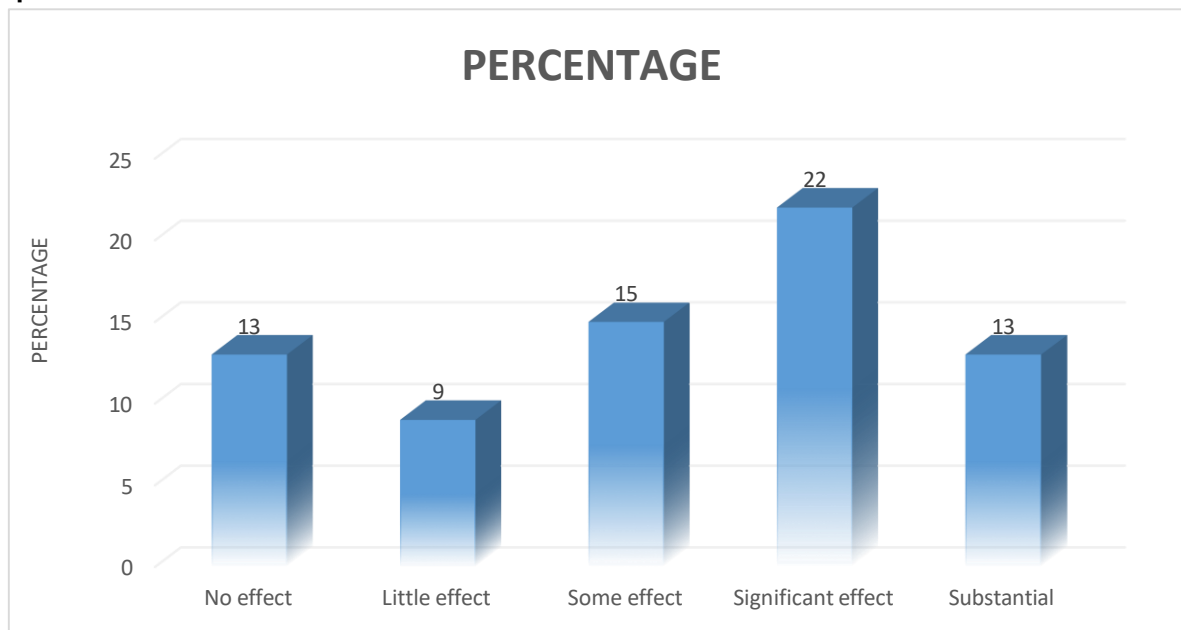
Source: Ofori-Kuragu, J.K. 2013

⁵⁷ Ofori-Kuragu, J.K., 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

The Processes involved in becoming a Contractor in Ghana are too easy

There is a perception that *the processes involved in becoming a contractor in the Ghanaian construction industry are too easy*. The suggestion here is that there are not enough safeguards in place to ensure that entities without the requisite qualifications do not become contractors or win contracts. The registration processes and general regulatory framework need to be strengthened to ensure that contractors and would-be contractors have both the technical and financial capacities for the classes of membership for which they apply. Fig. 3.15 shows the contractors' perspective of how the lack of effective barriers restricting entry into the Ghanaian construction industry as a contractor affects performance in the industry.

Figure 3.15: How "lack of effective barriers to entry" affects Ghanaian construction firms' performance⁵⁸



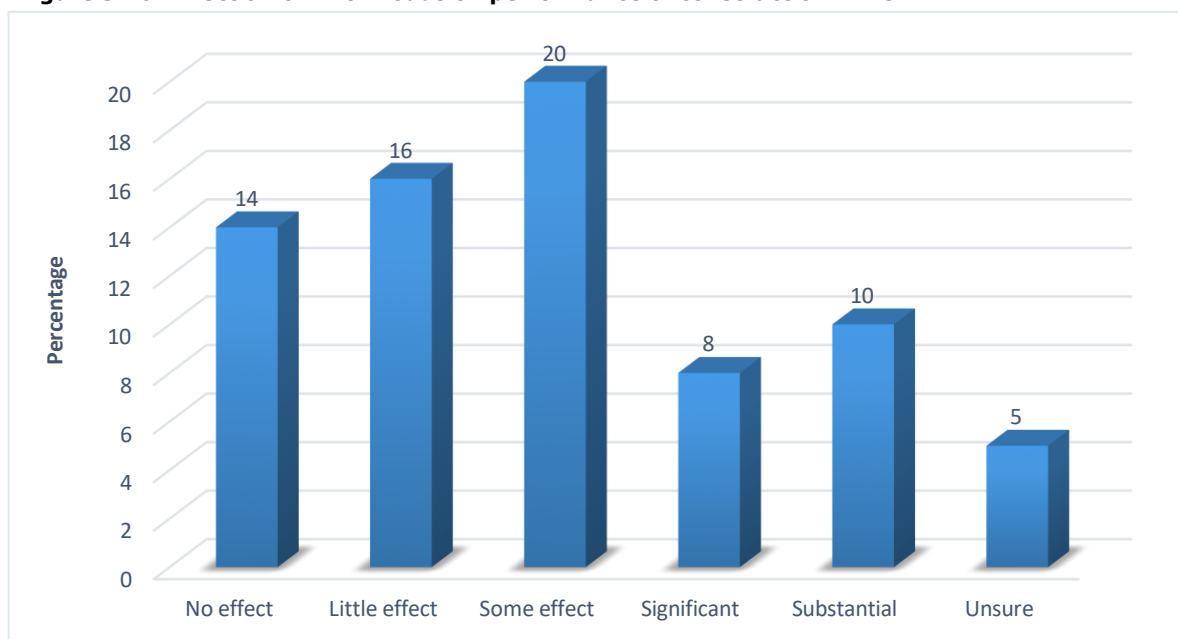
Source: Ofori-Kuragu, J.K. 2013

Low Workloads of Contractors in the Ghanaian Construction Industry

Another concern within the construction industry is the low workloads of Ghanaian contractors. The number of contractors relative to the size of the economy means that too many contractors are chasing a limited number of jobs. Contractor turnovers are thus small and profit margins low. This has a wide range of effects on other areas such as contractors' ability to invest in relevant technology, research and development and solvency. Fig. 3.16 shows the distribution amongst contractors of how low workloads affect construction performance in Ghana.

⁵⁸ Ofori-Kuragu, J.K., 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

Figure 3.16: Effect of low workloads on performance of construction firms⁵⁹



Source: Ofori-Kuragu, J.K. 2013

3.4.4 Most Critical of the Factors affecting Contractor Performance

All fourteen factors that were identified as affecting the performance of Ghanaian contractors are relevant. To get a sense of which of these problems most affects performance in the Ghanaian construction industry, factor analysis was used. Following the factor analysis, the most important factors seen to affect performance in the Ghanaian construction industry were identified in descending rank order as: Access to credit, lack of capacity to compete with foreign owned firms, low technology available to construction firms, poor preparation for projects e.g. project planning, and contracts awarded on the basis of contractor's political affiliation.

Fundamental to the problems affecting the Ghanaian contractors are issues relating to funding and access to finance. These appear intrinsically linked to many of the other problems that the contractors face. Whilst improved access to finance and cash flow issues cannot be seen as a panacea to the problems which Ghanaian construction firms face, addressing these will provide an impetus to solving many of problems. Improving access to finance and cash flow for Ghanaian construction firms will provide the contractors with flexibility to select the types of projects in which to participate.

⁵⁹ Ofori-Kuragu, J.K, 2013. Enabling World-Class Performance in Ghanaian Contractors: A Framework for Benchmarking

3.5 Action Agenda for transforming Construction in Ghana

3.5.1 Strategies to improve Ghana's Construction Industry

The following recommendations are made to reflect the needed actions required to transform the Ghanaian construction industry into an industry fit for purpose and delivering twenty-first century excellence. Some of the specific actions proposed are as follows.

Improving Access to Finance and Credit for Construction Projects

The following recommendations are made to improve access by construction firms to finance and credit:

- i. The establishment of a Housing and Construction Bank;
- ii. Construction firms should broaden the scope of services they offer to include participation in new and emerging areas such as facilities and asset management as well as speculative commercial developments;
- iii. Innovative approaches to financing construction projects including the use of new Public Private Partnership (PPP) approaches;
- iv. The use of joint ventures with foreign construction firms to raise finance from overseas sources. During the procurement processes for projects, contracts could be modified to provide for foreign contractors partnering with Ghanaian contractors with the right experience;
- v. Partnerships between Ghanaian construction firms and foreign financial and investment institutions to raise capital for infrastructure projects;
- vi. The use of government financial instruments such as sovereign bonds to lower the cost of borrowing from foreign sources;
- vii. The provision of loan guarantees and incentives such as tax breaks for construction firms to lower the costs of domestic borrowing from commercial banks;
- viii. The use of the project finance system of financing under which projects will be financed using borrowed funds which use the future expected cash flow from the sale or use of the facility or parts thereof as guarantee for loans;
- ix. Ensure that funding for public sector projects are secured and ring-fenced before projects begin to minimise delays and escalation costs of finance arising from funding delays;
- x. Explore new sources of funding road infrastructure such as the introduction of a road tax for all vehicles to boost the road fund.

House Building

House building can be used as a strategic tool to boost the output of the Ghanaian construction industry and overall national development. Some strategies to achieve these are as follows:

- i. Develop a comprehensive programme to stimulate housebuilding to address the large housing deficit and serve as a major driver of industry development and economic growth. This can be achieved through innovative initiatives and strategic partnerships between traditional real estate developers, construction firms, financial institutions, central and local government and other stakeholders in the industry;
- ii. Develop a comprehensive mortgage system for Ghana's housing market;
- iii. Establish public private partnerships between the governments—represented by local authorities, the Land Commission Secretariat, and real estate developers to promote affordable property development schemes;
- iv. Develop a strong property market through strong and effective collaboration and partnerships amongst all stakeholders;
- v. Simplify the land acquisition processes to enable real estate developers to easily obtain new lands for development. Government land banks can provide litigation free opportunities for investors and developers;
- vi. Promote PPPs in the development of real estate property between the central or local government authorities and real estate developers. This can be achieved through the use of public lands and private sector capital.

Promoting and Supporting Research

- i. Increase collaboration between research and academic institutions and industry in setting the research agenda to ensure research focuses on the needs that genuinely impact the Ghanaian construction industry. This will also help improve the uptake of research outcomes in Ghana by government, government agencies and industry;
- ii. Increase support and funding for research into the critical issues affecting the Ghanaian construction industry and overall national development. This can be achieved through support for research institutions, funded academic research and postgraduate scholarships;
- iii. Promote research innovation through awards for excellence and achievement, especially in the areas of new technologies, new materials and new approaches to construction. Ghanaian researchers should be challenged and motivated to ensure research outputs keep pace with developments and emerging trends in the industry.

Performance Monitoring and Measurement

Strategies to improve performance in the Ghanaian construction industry include:

- i. Developing a formal performance measurement system for the Ghanaian construction industry to promote performance measurement amongst Ghanaian construction firms;
- ii. Undertaking a comprehensive review of the processes used in the Ghanaian construction industry, including the pre-contract processes, construction phase processes and post construction processes, to ensure these are in line with best global practices;
- iii. Identifying the critical success factors (CSFs) which are required for performance excellence in the Ghanaian construction industry;
- iv. Identifying a set of common key performance indicators (KPIs) for measuring performance in the construction industry;
- v. Establishing an independent agency for the implementation of the performance measurement system and to promote the industry-wide KPIs;
- vi. Promote collaboration between Ghanaian consulting firms and best-practice international counterparts to jointly work on projects in Ghana. This will amongst other things, promote technology transfer and help the Ghanaian consultants to learn from the experiences of others;
- vii. Increase education and awareness within the industry of new approaches such as BIM, Green Building principles, Collaborative Working, Lean Construction, Six Sigma tools, Value Management, Off-site construction, Sustainable construction etc. and increase the uptake of these new approaches into the delivery of construction projects in Ghana. In line with this, it is recommended that educational and training institutions should revise their curricula where needed to integrate these new approaches into their programmes. Also, additional research efforts can focus on these areas to learn from best global practices and adapt these to the Ghanaian construction industry;
- viii. Provide continuing professional development (CPD) opportunities through short courses and postgraduate programmes for managers in the construction industry;
- ix. Establish a training and certification regime that ensures that all artisans and operatives — both skilled and unskilled — in the construction industry undergo training and obtain formal certificate to practice in the Ghanaian construction industry.

Leadership of the Construction Industry

Some strategies to improve leadership in the industry are as follows:

- i. There should be a central agency responsible for leadership and regulation of the Ghanaian construction industry. This body will also be responsible for maintaining a register of construction firms in good standing;
- ii. There should be increased support for the development of strong professional bodies for all functions within the Ghanaian construction industry and promotion of collaboration amongst the respective professional bodies;
- iii. Establish an industry-led forum of all stakeholders which will provide leadership and advocacy on the issues that affect the industry. The pan-industry body will provide a single voice for the industry in making representations to the government and other industry regulators.

Infrastructure Development

Strategies to accelerate infrastructure development in Ghana are made as follows:

- i. Ghanaian construction firms should consider investing in the development of infrastructure which they will manage themselves or leave to the government to manage;
- ii. Improve the implementation process for public private partnerships (PPPs) to boost the numbers of projects which move on to the implementation phase. This should involve a thorough review of the current system to identify and remove any bottlenecks which hinder the implementation processes. There should also be increased education and awareness on innovative PPP systems for construction firms to increase their participation in the implementation of PPP projects.

Development of Local Materials and Equipment

Some recommendations for improving the availability and uptake of local materials and equipment in the Ghanaian construction industry:

- i. Collaborate with academics, researchers and research institutions to identify existing research on local materials and how the research findings can be implemented;
- ii. Provide incentives to input suppliers and manufacturers of local building materials to help lower the costs of production and thus the costs on the market. There should be a clear cost benefit to using the local materials;
- iii. Provide increased support to local research establishments for on-going research into refining existing local materials whilst identifying new possibilities. The research and academic training institutions should be resourced to offer technical services and support for users of local building materials;

- iv. The use of local building materials wherever possible for public projects should be obligatory whilst encouraging the private sector to utilize local materials on projects;
- v. Learn from the experiences of other countries where the equivalent of locally produced building materials such as burnt clay bricks are widely used to grasp lessons on how to improve quality whilst lowering costs;
- vi. Offer training programmes to develop skilled artisans in the use of local building materials;
- vii. Support academic and research institutions to develop construction plant and equipment locally;
- viii. Provide financial support to Ghanaian companies which manufacture construction plant and equipment locally;
- ix. Partner with foreign manufacturers to assemble construction plant and equipment locally;
- x. Provide incentives such as tax waivers and exemptions to local and foreign owned manufacturers of both local materials and construction plant.

Reducing Construction Costs

Some recommendations to reduce overall construction costs are:

- i. Improving project preparation including accurate estimates and bill preparation, accurate drawings and minimising variations etc.;
- ii. The development and introduction of a comprehensive building cost information system specially adapted to the Ghanaian construction industry with data on all project types to aid project costing and estimating;
- iii. Benchmarking building cost information with leading countries and working progressively to reduce costs in line with leading performers globally;
- iv. The use of modern methods and tools for project preparation such as the integration of building information modelling into project preparation, the use of estimating software, software for the preparation of bills of quantities, use of project management software and the broader use of new and emerging technologies for the overall management of the different stages of the project life cycle;
- v. The increased use of off-site construction techniques and prefabricated components in projects;
- vi. Improving the procurement process to ensure that the best bid that provides value for the client's money is accepted;
- vii. Reduce the over-reliance on lowest evaluated tender to eliminate the practice where tenders are under-priced to help contractors win contracts after which adjustments in the price are made;

- viii. As a policy, all drawings and documentation for public projects should be fully completed before the procurement process commences;
- ix. Use local alternatives to expensive imports especially for public projects. The increased patronage of locally produced materials will ultimately lead to significant reductions in prices to enhance competitiveness;
- x. The use of appropriate financing methods which ensure the best value-for-money for public funds;
- xi. Promote the use of lean construction techniques in the implementation of projects;
- xii. Promote the use of value management and value engineering as part of the preparation of projects.

Skills Development

Some suggestions for developing a skilled workforce are as follows:

- i. Developing an industry-wide certification programme which ensures that all trades operatives and artisans in the Ghanaian construction industry meet basic training, competence and certification to practice;
- ii. Reviewing the training programmes and curricula for construction professionals to ensure these are consistent with global trends and global best practices;
- iii. Researching the numbers of professionals being trained in all categories in the Ghanaian industry to ensure they are adequate for the industry's needs;
- iv. The introduction of new professional qualifications for management categories in the construction industry to ensure all managers of construction firms have relevant professional qualification such as Prince 2, Project Management Professional (PMP) Certification etc.;
- v. Supporting the development of professional bodies especially for professional groups such as structural engineers, building services engineers etc. which do not have existing professional bodies.

3.6 Need for a Regulatory and Development Body

3.6.1 Overview

In order to surmount the challenges, the Ghanaian construction industry needs to pursue a vision of a construction industry development strategy and agenda that could promote stability, foster economic growth and international competitiveness of local industry players, create sustainable employment, and address any historic imbalances as it attempts to generate a new construction industry capacity. A model for development of Ghana's construction industry has been proposed at the core of which is the proposal for the establishment of a central agency.

3.6.2 Evidence of International Best Practice

Similar challenges in other emerging countries resulted in the establishment of central agencies to coordinate the activities of all construction works. Interestingly, most of these countries are making very remarkable strides comparatively towards economic development. It is widely acknowledged that a strong construction industry which is properly regulated by designated bodies is a major stimulator of development in these countries. For instance, Singapore, Malaysia and South Africa have the Construction Industry Development Board (CIDB); Construction Industry Council (Hong Kong), Construction Industry Development Council (India), National Construction Services and Development Board (Indonesia) and the Institute for Construction Training and Development (Sri Lanka). Typically in Africa, countries like Zambia, Rwanda, Malawi, Kenya and Tanzania all have central bodies that are mainly responsible for the regulation and development of their construction industries.

3.6.3 Proposed Model for Ghana

Significant consultations, discussions and studies have already been undertaken on the proposals to establish a central agency to lead the construction industry regulation and development in Ghana. There is a general consensus and it is highly recommended by most built-environment professional institutions and trade associations that Ghana adopts the model of the Construction Industry Development Board (CIDB) of South Africa.

The South African CIDB model has been studied sufficiently at first hand during a field visit and study tour to South Africa by some built-environment stakeholders. It was noted that the South African model is a hybrid based on the best aspects of the Singaporean and Malaysian models. To better understand the workings of the South African model, similar study visits and tours were undertaken to Malaysia and Singapore by a delegation drawn from across a broad spectrum of the Ghanaian construction industry from both the private and public sectors. Whilst there are many other examples of best practice models around the world, the South Africa model offers some advantages to the Ghanaian case given that it is situated in the African context, milieu and culture. Other reasons for this recommendation and consensus include amongst others:

- i. South African CIDB functions as a regulatory, development and advisory body with creativity, commitment and passion of the team and stakeholders;
- ii. South African CIDB has created a massive transformation leading to a vibrant, regulated and respectable industry with a fair playing field for all players;
- iii. South African CIDB has fostered a partnership approach with its core partners and networks in both the public and private sectors;
- iv. The construction industry in Ghana mirrors what pertained in South Africa;
- v. The CIDB of South Africa is a member of a network of contractor development organisations in Africa. A similar approach in Ghana can result in regional co-operation on developing the construction industry, sharing of knowledge and expertise.

From the work so far done, the consensus was to establish a Construction Industry Development Authority (CIDA) for Ghana. Currently, a Legislative Bill, which sets out the details and proposals for the establishment of CIDA, has been drafted and comments/queries from the Attorney Generals' Department have been responded to.

Mission and Vision

The mission of the proposed body is to build a world-class construction industry to enhance the competitiveness of the industry's people, products and businesses.

CIDA – Ghana will aim to develop the capacity and ability of the players in the Ghanaian construction industry, to enhance the quality of the industry's work, profitability and productivity through the promotion of professionalism, innovation and knowledge.

Objectives

The specific objectives of the proposed CIDA – Ghana are to:

- i) Promote and stimulate the development and expansion of the Ghanaian construction industry;
- ii) Advise and make recommendations to the Government on matters relating to the construction industry;
- iii) Promote, stimulate and undertake research in matters relating to the construction industry;
- iv) Promote, stimulate and assist in the export of services relating to the construction industry;
- v) Provide consultancy and advisory services with respect to the Ghanaian construction industry;
- vi) Promote quality assurance in the Ghanaian construction industry;
- vii) Initiate and maintain a construction industry information systems for Ghana;
- viii) Encourage the standardisation and improvement of construction techniques and materials;
- ix) Provide, promote, review and coordinate training programmes organised by the public and private construction training centres for skilled construction workers and construction site supervisors;
- x) Accredite and register contractors with the authority to cancel, suspend or reinstate the registration of any registered contractor;
- xi) Accredite and certify skilled construction workers and construction site supervisors.

3.6.3 Key Pillars of the Proposed CIDA Model

The framework for the establishment of the proposed CIDA-Ghana will be anchored on three (3) thematic areas: process, tools and people. These key pillars represent the short, medium and long-term priorities for the construction industry development programme. It will be focused on Construction Business Development, Construction Technology Development and Construction Manpower Development respectively, briefly described below.

Construction Business Development (Process)

This recognises the development of construction business as a key pillar to the success of the proposed model. The emphasis is to promote and improve construction business, the construction environment and build capacity of construction businesses as the basis for achieving quality, innovation, creativity and enterprise. To achieve this, CIDA will encourage the improvement of the overall construction business environment to create an enabling environment for construction enterprises including improved access to finance by construction firms, appraise the industry's performance to establish how this impacts the performance of construction businesses, facilitate the preparation of industry strategic plans, support the development of capacity and capabilities of Ghanaian construction firms. It is hoped that this will help transform the industry's performance and enhance the competitiveness of Ghanaian construction industry businesses at the global level.

Construction Technology Development (Tool)

This focuses on the development of technology within the Ghanaian construction industry as a key tool in the workings of the proposed CIDA model for Ghana. The objective is to enhance construction quality, productivity, profitability, innovation and promote sustainable development amongst other positive outcomes. CIDA Ghana's role will involve promoting and facilitating the introduction and uptake of new technologies in the Ghanaian construction industry, whilst supporting the industry to adopt modern techniques and mechanisation in construction. This is to be achieved through the adoption of the industrialised building system (IBS), integration of construction information system, research and development in construction, promotion of quality standards and practices and encouragement of safety, health and environmentally friendly and sustainable construction practices, including facilitating machinery fabrication and material manufacture. It is also intended to develop and manufacture construction materials to feed into the industry — cement, bitumen, aluminium, steel products, timber, electrical and plumbing materials, ceramic and porcelain tiles, glass, quarry and concrete products, etc.

Construction Manpower Development (People)

This recognises the industry's manpower as being very critical to its development. The CIDA model proposed thus places significant emphasis on developing people working in the industry and aims to produce a skilled workforce equipped with the knowledge and competencies of the twenty-first century construction industry. CIDA - Ghana will commit to developing the whole spectrum of the construction industry's workforce, including construction site workers, site supervisors, and management level personnel for all categories of construction firms. It is expected that skills development will be encouraged and enhanced and developed for high level, middle level, and low-level personnel to support the sector.

Chapter 4 Human Resource and Skills Planning

4.1 Introduction

The National Development Planning Commission (NDPC) recognises the importance of planning for the human resource requirements as one of the key elements to a successful implementation of the GIP. The main aim for this process is to ensure that the right skills set and human resource capacity are adequately planned for and acquired in the delivery of the objectives of the plan. This report therefore presents a description of the current state of the Ghanaian labour market; a comparative analysis of Ghana and other emerging economies of Asia; human resource (HR) planning; maintaining a sustainable workforce; and funding strategies to support the HR plan.

4.2 Overview of the Ghanaian Labour Market: The Current Status

The current status and demand for labour suggest that there exists the potential of adequate labour supply to accomplish its basic socioeconomic activities in Ghana now, and over the plan period. This is evidenced in the majority of the active population (79.6%) falling within the working age group of the country, as depicted in Table 4.1.

Table 4.1: Breakdown of the labour force participation rate in Ghana by age group and sex (+15)

ACTIVITY STATUS/AGE GROUP	MALE	FEMALE	TOTAL
Population 15-60	61.0	64.0	62.6
Currently Active	83.6	79.5	81.4
Employed	95.0	94.3	94.6
Unemployed	5.0	5.7	5.4
Currently Inactive	16.4	20.5	18.6
Population 15+	67.5	71.5	69.6
Currently Active	82.2	77.3	79.6
Employed	95.2	94.5	94.8
Unemployed	4.8	5.5	5.2
Currently Inactive	17.8	22.7	20.4

Source: GSS, (2014), Ghana Labour Survey Report

The figures show that 94.8% of the population that is fifteen years and older, is employed. A substantial proportion of about 88%⁶⁰ of this group, however, is found in the informal sector, which is made up of mostly unregistered small and medium-sized enterprises (SMEs), unregulated and unprotected wage employees that are highly intractable. Adequate supply of skilled labour would thus be difficult to find in the country's current labour market.

Ghana, therefore, needs to develop an educational and career tracking system that documents every individual's education and career moves at reasonable intervals. This would inform the kind of learning/institutions that need critical attention from the government, academia and industry. Ultimately, the nation's development goals must also be aligned with these trends.

⁶⁰ An increase of roughly 8% from the 2000 census survey

The pattern of education in Ghana for the section of the population that is 15 years and older ⁶¹ by sex, is presented in Table 4.2. It can be observed that a quarter of this population has never been to school; and it is more so for females compared to males. People with less than Middle School Leaving Certificate (MSLC)/Basic Education Certificate Examination (BECE) form the highest band in the educational groupings; which together with persons who have never been to school, to a large extent, explain the large informal sector in the country.

With some level of education but no certificate to clearly indicate skills in order to pass through the first occupational screening, these persons are neither attracted to, nor absorbed by the public sector; not to mention the formal private sector. They are thus pushed to create a niche in the economy for themselves by forming micro, small and medium scale enterprises, on-street vending or offering other services to some formal private sectors without a contract. They are usually without recognised trade certificates, poorly paid, work under poor environmental conditions, and not covered by standard government employment policies.

In order to reduce the attractiveness of the informal sector, government must introduce measures to get the pre-secondary students to either further their education or placed in vocational institutions to develop and/or sharpen their talents. As a priority for succeeding governments of Ghana, Technical/Vocational centres must be institutionalised and established in all districts in the country, in order to build mid-level capacity, to ensure the success of the GIP. These institutions should also be managed by talented and well-trained professionals, with experience from Newly Industrialised Countries (NIC) like South Korea or other countries with similar experiences that Ghana seeks to achieve.

Table 4.2: Educational attainment of the population 15 years and older by sex

LEVEL OF EDUCATION	MALE	FEMALE	POOLED
Never been to school	20.8	30.2	25.7
Less than MSLC/BECE	36.9	37.2	37.1
MSLC/BECE/Vocational	25.7	21.9	23.7
Secondary/SSS/SHS and higher	16.6	10.7	13.5
Total	100	100	100

Source: GSS, 2014: Ghana Labour Survey Report

The level of educational attainment is somewhat positively correlated to the skills an individual acquires over a given period, and therefore determines a person's potential labour force participation as well as wages. For example, the Ghana Labour Survey shows that most highly educated individuals are found in professional, clerical, technician, legislative, and managerial positions etc., (see Table 4.3). The less educated, on the other hand, are observed in skilled agriculture/fishery and elementary occupations, which generally comprise skills levels "1 & 2" as classified in the International Standard of Classification of Occupations (ISCO-08). This statistic is consistent with similar data collated from other African countries like Cote D'Ivoire and Uganda.

A typical explanation is that people tend to leave agriculture (their primary occupation) to 'blue-' and 'white-collar' jobs with increased education. Overall, roughly half of the

⁶¹ The population of this age group is approximately 23 million (GSS, 2014).

economically active population either has less than MSLC/BECE or never been to school. This does not augur well for the highly skilled labour force required for the high-income country status or the economic development that Ghana aims to achieve. This is besides the quality of education that the remaining educated half can proclaim.

Table 4.3: Educational attainment of currently employed population 15 years and older⁶² by main occupation

GIP OCCUPATIONAL CLASSIFICATION⁶³	MAIN OCCUPATION	NEVER BEEN TO SCHOOL	LESS THAN MSLC/ BECE	MSLC/BECE /VOCATIONAL	SECONDARY/ SSS/ SHS AND HIGHER
Skills level 3 & 4: Managers & Professionals	Legislators/managers	6.9	8.7	24.9	59.6
	Professionals	1.2	1.4	9.9	87.5
	Technicians and associate professionals	1.8	6.0	28.8	63.4
Skills level 2: Skilled Trade Labour and Related Trades Workers	Clerical support workers	0.8	1.6	24.5	73.2
	Service/sales workers	17.8	23.6	40.1	18.6
	Skilled agric/fishery workers	39.0	29.6	25.9	5.6
	Craft and related trades workers	16.7	20.9	47.1	15.3
Skills level 1:	Plant machine operators and assemblers	8.4	17.2	56.6	17.7
	Elementary occupations	20.1	30.2	38.3	11.4
	Other occupations	0.0	0.0	30.0	70.0
	All	25.2	24.0	33.2	17.6

Source: GSS, 2014: Ghana Labour Survey Report

Table 4.4 shows the active population group by industrial demarcation, and also gives a pattern that is consistent with main occupation and education as previously described. It can be seen that the majority (44.7%) of the population are engaged in agriculture, forestry and fishing activities, which is about the same proportion of the population that has less than MSLC/BECE or zero educational attainment.

The industry groups (in bold) are expected to undergird and spur on the GIP. Currently, slightly more than a third of the active population is engaged in these sectors. Also, there are usually more males than females engaged in these industries. Generally, employment in Ghana is still largely agrarian, followed by the services sector, with the manufacturing sector offering less than 10% of employment opportunities. This phenomenon contradicts the typical development course of a country, which is typically in the order of agrarian, manufacturing and services.

Table 4.4: Currently employed population 15+ by industry group and sex

INDUSTRY GROUP	MALE	FEMALE	POOLED
Agriculture, forestry and fishing	48.2	41.4	44.7
Mining and quarrying	2.8	0.6	1.6
Manufacturing	7.7	10.3	9.1
Electricity, gas, steam, and air conditioning supply	0.3	0.0	0.2
Water supply, sewerage, waste management	0.3	0.2	0.2
Construction	6.7	0.2	3.3
Wholesale and retail trade	10.3	28.0	19.5

⁶² The population size of this group is 16million (GSS, 2014)

⁶³ Details are given in Appendix A (Final Report).

Transportation and storage	7.7	0.3	3.8
Accommodation and food service activities	0.9	6.7	3.9
Information and communication	0.6	0.2	0.4
Financial and insurance activities	0.9	0.5	0.7
Real estate activities	0.1	0.0	0.1
Professional, scientific and technical activities	1.3	0.7	1.0
Administrative and support service activities	1.5	0.5	1.0
Public administration and defense	1.2	0.4	0.8
Education	4.4	2.9	3.6
Human health and social work activities	0.9	1.1	1.0
Arts, entertainment and recreation	0.8	0.1	0.4
Other service activities	2.8	4.8	3.8
Activities of households as employers	0.6	1.1	0.9
Activities of extra territorial organisations and bodies	0.0	0.0	0.0

Source: GSS, 2014: Ghana Labour Survey Report

In relation to unemployment, 5.2% of the economically active population have not been able to find jobs, although they are available to work. Compared to males, however, females are more likely to be unemployed, and this phenomenon is more prevalent in urban areas (Table 4.5). Again, unemployment is higher among the youth within the 15–24 age cohort. This group also forms the largest band (55.5%) in the population distribution of the country, followed by the 25–35 age group that forms 44.5% (GSS, 2014). Since these are the major resource pools for a longer period of time, the government and infrastructural related institutions must put in place policies and institutional frameworks to improve learning and the general employment conditions in the country to capture those in these age brackets. These policies must include those that would stimulate employment creation, entry and training to up-scale skills in the economy as well as address structural challenges to achieving full, decent, productive and freely chosen employment⁶⁴.

Table 4.5: Unemployment rate of population 15+ by age group, sex and locality

AGE GROUP	MALE	FEMALE	TOTAL	URBAN	RURAL
15–24	10.2	11.7	10.9	16.3	7.1
25–44	3.3	4.1	3.8	4.6	2.8
45–64	2.8	3.2	3.0	3.5	2.5
65+	2.6	2.5	2.5	2.3	2.7
All	4.8	5.5	5.2	6.5	3.9

Source: GSS, 2014: Ghana Labour Survey Report

4.3 Sources of Labour and Focused Areas of Supply

The educational attainment of the employable age-group⁶⁵ is a basic indicator for determining the type and source of labour in an economy. This gives an indication of the potential stock of skills in the economy. Nearly half of the Ghanaian population has either never been to school or not attained basic school certificate (Table 4.6).

Thus potentially, employers have access to only half of the population with some skills to begin with, and engage. Of these, persons with MSLC/BECE/Vocational form the largest band. Although they are the foundation upon which further training could be given for specific industries or indeed higher education, they are, more often than not, lured to the informal sector due to a lack of opportunities or guidance towards available

⁶⁴ Ministry of Employment and Labour Relations, National Employment Policy, volume 1 (Government of Ghana: 2014), 2.

⁶⁵ This should ideally be the population aged 25 and over.

opportunities. Consequently, persons with secondary and higher levels of education (17.6% of the relevant population) are comparably more available to work in all occupations; including those in the proposed infrastructure plan by NDPC.

Table 4.6: Educational attainment of the population 15 years and above by sex

LEVEL OF EDUCATION	MALE	FEMALE	POOLED
Never been to school	18.0	31.9	25.2
Less than MSLC/BECE	21.5	26.3	24.0
MSLC/BECE/Vocational	37.6	29.1	33.2
Secondary/SSS/SHS and higher	22.9	12.6	17.6
Total	100	100	100

Source: GSS, GLSS VI Labour Survey Report, 2014

4.3.1 Skill Formation and Supply from Secondary Schools and Higher

The enrolment statistics of basic and post-basic education are relevant in the analysis of skills because according to the Organisation for Economic Co-operation and Development (OECD) and the World Bank report on skills indicators for Low Income Countries (LICs), they guide skills development policies as well as provide standards for country performance.

Table 4.7 presents Ghana's basic enrolment statistics. Enrolment and/or completion of primary and post primary education give an indication of the acquisition of basic skills as well as preconditions for progressing to higher levels of education. Currently, the Gross Enrolment Rate (GER) in primary education, for example, was slightly over 100%. The Net Enrolment Rate (NER) was also good (91%), albeit 100% was what the country aimed to achieve. The completion rate of primary school for the year in review (2013) was equally high at 99.6%, providing an adequate supply for junior secondary education. Enrolment in the Junior Secondary School (JSS), at least GER, was also high (85.4%), with a completion rate of 73.5%. This group should normally furnish SHS with students who have adequate basic skills for further training. However, only 45.6% of the group was enrolled in the SHS. One fundamental reason could be the non-attainment of BECE, the compulsory national examination for the completion of JHS, required for entry into SHS. The supply pool for employers is thus small. This is more so for infrastructure related industries, such as outlined in this plan, looking for vocation-specific skills like electricians, welders, carpenters, and steel fixers; with a GER of technical/vocational schools being less than 5% (see last column of Table 4.7).

Table 4.7: Basic Enrolment Statistics

NATIONAL	PRIMARY	JHS	SHS	TVET (2012/2013)****
Total enrolment (2014/2015)*	4,342,315 (99.6%)**	1,591,279 (73.5%)**	804,974 (44%)**	61,496
GER***	109.9%	89.8%	51.0%	2.7%
NER*	91.0%	49.0%	22.5%	

Source *: 2015 APR of the GSGDA II

**Completion rate in parenthesis

***Source: UNESCO Institute for Statistics (UIS) Database January 2016

****Education Sector Performance Report, 2013

Relatively more detailed statistics of the vocational/technical institutions is given in the

Table 4.8, which shows an overall decrease of 0.5% in the number of vocational/technical institutions, from 2013/14 to 2014/15. This is particularly so with regards to the private institutions. Total enrolment on the other hand increased by 5.3% (Table 4.9). This would at least increase the pool of readily available techno-savvy or industry-relevant labour supply that the infrastructure sectors require. Indeed, this second cycle pool of students would not only supply industries with current lower-level occupation aspirants, but also provide candidates to the tertiary institutions for further studies.

The above numbers (as portrayed in Table 4.7) are however not adequate to supply the requisite manpower for the proposed infrastructure development of the country⁶⁶.

Vocational education in Ghana has not been perceived as worthy of the requisite number of years spent in school. Parents, and indeed society as a whole, would rather have their wards learn from a master craftsman in an informal setting if vocational or technical skills are the end products of such schooling. The general perception is that formal education should result in achieving certificates for formal employment.

Table 4.8: Numbers of Technical and Vocational Institutes

	2011/20 12	2012/20 13	2013/20 14	2014/20 15	2013/14 to 2014/15 (% change)
Public Institutions	141	107	118	120	1.7
Private Institutions	111	74	68	65	-4.4
Total Institutions	252	181	186	185	-0.5

*Source: Education Sector Performance Report, 2015

Table 4.9: Enrolment in Vocational Education - Number

	2011	2012	2013	2014	2015	2014 to 2015 (% change)
Total Enrolment	71,848	79,986	61,496	41,065	43,248	5.3%

Source: UNESCO Institute for Statistics (UIS) Database January, 2016

Admissions to tertiary institutions are not automatic. They are determined by a WASSCE/SSSCE pass rate⁶⁷ at credit level in four core subjects, namely Mathematics, English, Integrated Science and Social Studies. A pass rate falls within A1 and E8. However, the minimum grades required for a candidate to enter into tertiary education are within A1 to C6 inclusive. Of the 242,157 students that took the WASSCE in 2014, 48%, 64%, 46% and 71% achieved the pass rate in Mathematics, English, Integrated Science and Social Studies respectively (see Table 4.10). It can be observed that males had a relatively higher pass rate in all subjects except English. The gap is highest in Mathematics, which is also a core entry subject to the sciences and technology courses at the tertiary level. Some students with passes in mathematics opt for courses in the Faculty of business, for instance, instead of the sciences.

In Table 4.10, the pass rates in Mathematics and Integrated Science are relatively lower compared to those in English and Social Studies. These outcomes suggest that the

⁶⁶ Vocational enrolment in for example South Korea and Malaysia (two highly-developed countries) are 337,133 (2013) and 333,816 (2015) respectively.

⁶⁷ This is calculated for students that received grades after sitting for the exams. It excludes candidates whose results were cancelled or were absent.

government must give extra focus to Science, Technology, Engineering and Mathematics (STEM) related programmes, be it training and/or industry exposure, to boost interest and performance. For instance, by making careers in industry rewarding, students would be encouraged to invest time and resources to improve their learning in that area. This would consequently improve industry, which would feed back to the learning institutions and develop a positive cycle that would facilitate the implementation of the vision of the GIP. In order to realise this objective, government must do the following:

1. Offer scholarships to deserving students;
2. Provide subventions to institutions with STEM as their core training mandate to increase accessibility;
3. Review subjects taught as well as check the availability of teachers and laboratory facilities;
4. Encourage female, rural and even informal participation in STEM related institutions; and
5. Begin scouting for potential students from primary school, with dedicated follow-up programmes.

Table 4.10: WASSCE Pass Rates at credit level in Core Subjects, 2014

	MATHEMATICS	ENGLISH	INTEGRATED SCIENCE	SOCIAL STUDIES
Male	51%	63%	48%	73%
Female	44%	65%	43%	69%
Total	48%	64%	46%	71%

Source: 2015 APR of the GSGDA II

Tertiary institutions are potentially, suppliers of higher skilled labour to the market. These consist of universities, polytechnics and specialised colleges. Ghana had 141 tertiary institutions at the end of 2014/15 (Table 4.11). The number of public universities/university colleges increased from six in 2011/12 to nine in 2014/15. Private tertiary institutions also increased in number and now constitute the largest number of tertiary institutions. An overall increase of 10.2% in the number of tertiary institutions from 2013/14 to 2014/15 somewhat suggests increased opportunities as well as access to the acquisition of higher skills. Future supply of highly skilled labour may rise, and employers would have a larger pool to choose from.

Table 4.11: Number of Tertiary Institutions in Ghana, 2011/12 to 2014/15

INSTITUTION	2011/12	2012/13	2013/14	2014/15	2013/14 to 2014/15 % change
Public Universities/University Colleges	6	9	9	9	0
Public Specialised/Professional Colleges	9	8	8	8	0
Chartered Private Tertiary Institutions	3	3	3	3	0
Private Tertiary Institutions	55	51	60	65	8.3
Polytechnics	10	10	10	10	0
Public Colleges of Education	38	38	38	38	0
Private Colleges of Education	3	3	3	8	166.7
Total	124	119	128	141	10.2

*Source: 2015 APR of the GSGDA II

The number of polytechnics however remained same over the four-year period observed in Table 4.11. The polytechnics have now been upgraded to technical universities except

for two (Wa and Bolgatanga Polytechnics), which are yet to meet the requirements⁶⁸ for the upgrade. According to the Technical Universities Act (2016), accredited institutions are expected to provide higher education in engineering, science and technology based disciplines, technical and vocational education and training, applied arts and related disciplines. Some of the guiding principles for these technical universities include the use of competency based and practice oriented approaches in teaching, organisation and delivery of courses; and the development of strong linkages and collaboration with relevant industries, businesses, professional bodies and technical experts in the design and delivery of programmes, as these provide opportunities for technical and professional skills development, applied research and publication of research findings. What thus sets the technical universities apart from the traditional ones include the following as outlined in Table 4.12.

Table 4.12: Comparison of Technical Universities and Traditional Universities

S/N	TECHNICAL UNIVERSITIES (UNIVERSITY OF APPLIED SCIENCES)	TRADITIONAL UNIVERSITY (CLASSICAL/RESEARCH UNIVERSITY)
1	Teaching and practice-oriented	Theory and research oriented
2	Applied or strategic research with focus on solving practical problems and providing technology solutions that make production systems more efficient Skills-driven or acquisition of employable skills	Integration of research and teaching Knowledge-driven or quest for new knowledge
3	Focus on technology development, innovation and technology transfer	Focus on fundamental research and cutting-edge technology development
4	Emphasis on what must be learnt to respond to industry needs and learner interests	Emphasis on mainly disciplinary approach to learning and promotion of scholarship

Source: Report of the Technical Committee on the Conversion of the Polytechnics in Ghana to Technical Universities

In accordance with the increased number of tertiary institutions, the total number of students enrolled increased from 261,962 in 2011/12 to 320,746 in 2014/15 (Table 4.13). The technical/science faculties also noted an overall increase in enrolment. Although this increase is slight, it could potentially generate 41% of 320,746 new labour market entrants into the science and technology based industries such as engineering, statistics and computer science. It should also be noted that a good number would graduate from the Arts and Business programmes, since the science and technology institutions are not entirely science-based. Due to measly government subventions, some of these institutions divert their focus from their core mandates (the sciences and technology) to the Arts and Businesses, which enable easier access to funds. This is a pertinent issue that must be addressed by government.

Table 4.13: Enrolment: Tertiary Institutions, 2011/12 to 2014/15

INSTITUTION	2011/12	2012/13	2013/14	2014/15	2013/14 2014/15 change	to %
Total Public Institutions	202,063	221,632	238,574	248,507	4.2	
Total Private Institutions**	59,899	61,874	75,272	72,239	-4.03	
Total Tertiary enrolments	261,962	283,506	313,846	320,746	2.2	
% Enrolment in Science /Technical						

⁶⁸ See the Technical University Act, 2016; Act 922.

Public Universities	41.4%	39.1%	40.2%	40.0%	-0.5
Polytechnics***	33.8%	36.7%	39.4%	43.0%	9.14
Total	39.1%	38.4%	40.1%	41.0%	2.24

Source: 2015 APR of the GSGDA II

** includes private universities and private Colleges of Education.

***Based on the science/humanities ratio of enrolled students in the Polytechnics (Source: Summary of Basic Statistics on Polytechnics, various series)

Compared with Emerging Economies such as South Korea, Malaysia and Singapore that had similar socioeconomic status as Ghana at Independence (1957), Ghana is performing poorly. Table 4.14 for instance shows that Ghana had a fairly comparable GDP per capita in early post-independence years (1960), and was described as the wealthiest nation in Sub-Saharan Africa (The Economist, 1989). Clear indications of economic underperformance began to emerge as differences in GDP per capita widened some years later. For instance Ghana, as at 1980, realised a GDP per capita of \$412 whilst South Korea, Malaysia and Singapore achieved \$1,711, \$1,900 and \$5,004 GDP per capita respectively.

Four decades later, the situation is even worse as Ghana trails with a GDP per capita of \$265, behind South Korea, Singapore and Malaysia that have increased significantly to \$11,947, \$23,793 and \$4,287 respectively.

One of the primary reasons for such diverging patterns in the growth of Ghana's economy vis-à-vis those of the other three countries is that Ghana still depends significantly on primary agricultural products for most of its export earnings. South Korea, Singapore and Malaysia at the very early years of independence made a decisive plan to move their economies from primary/agro-product dependency to secondary products such as manufacturing, industrial, and labour/skills (mostly knowledge-based). Accompanying these countries development plans are not only investments in the various infrastructure (as well as Gross Expenditure on Research and Development (GERD) in science, technology and innovation) to guide the objectives of the plans, but also significant allocation of funds for investment in education from primary to tertiary level, with special emphasis on vocational/technical education. Such commitments clearly paid off as the results show, with Ghana currently being a lower-middle income country (2015)⁶⁹ having a per capita income of \$1,364 and Malaysia being an upper-middle income (\$9,360) and South Korea (\$27,663) and Singapore (\$52,961) being high-income countries.

Table 4.14: Selected key socioeconomic characteristics of Ghana, South Korea, Malaysia and Singapore: Post-Independence

	GHANA	SOUTH KOREA	MALAYSIA	SINGAPORE
Independence	1957	1948	1957	1965
Colonies	British	Japan	British	British/Federation of Malaya
GDP (1960) in million US dollars (\$)	1,217	3,892	1,916	705
GDP per capita (1960) in US dollars (\$)	183	156	235	428
GDP per capita (1980) in US dollars (\$)	412	1,711	1,900	5,004
GDP per capita (2000) in US dollars (\$)	265	11,947	4,287	23,793
GDP per capita (2015) in US dollars (\$)	1,370	27,663	9,360	52,961
Education expenditure (% of GDP) (2001)	5.35	3.9	7.48	3.6
Education expenditure per capita (2001) in US dollars (\$)	24	439	309	766
Education expenditure (% of GDP) (2013)⁷⁰	5.9	4.62	6.29	2.91

⁶⁹ This was in 2011; a fairly recent achievement

⁷⁰ Except for South Korea (latest recorded figures at this source are for 2012)

Education expenditure per capita (2013) in US dollars (\$)	108	1,125	673	1,628
GERD⁷¹ (science, technology and innovation) – Total (in '000 local currency)	173,371 (2010)	63,734,126,793 (2014)	13,971,560 (2014)	8,526,470 (2014)

Source: World Development Indicators (last updated: 04/27/2017); UNESCO Institute of Statistics (UIS), January 2016

Holding all other possible influencing factors constant, a positive relationship between investment in education and economic growth of these countries can be observed in the data presented in Table 4.14. Although all the countries understudied in this section spent less than 10% of their GDP on education, expenditure on education per capita differed. Whilst Ghana spent \$24 per capita on education in 2001, South Korea, Singapore and Malaysia were spending \$439, \$766, and \$309 respectively (ibid). A decade later, the corresponding expenditure of these countries were \$108 (Ghana); \$1,125 (South Korea); \$1,628 (Singapore) and \$673 (Malaysia).

According to a global monitoring report, *"the Education for All"* (EFA, 2012), a contributing factor to the slow progress in education and corresponding sluggish economic growth in Ghana, is because of inadequate investment in education and/or linking economic planning with skills development policies in Ghana. Although significant education and economic reforms have been made over the years in Ghana, these may not have been linked well enough for socioeconomic advancement that could place the country amongst the highly developed, or to a lesser extent, an emerging economy like our contemporaries at independence. The other factor is lack of a consistent GIP in Ghana that is followed by successive governments.

4.4 Planning for Identified Skills

In developing a framework for planning the Human Resource (HR) requirements for the GIP, examples from developing countries like Namibia were leveraged, together with research from developed countries like the UK, Canada, and South Korea in order to outline an approach that is not only universal but one that could also be recommended for other developing and emerging countries.

HR Planning at a national level requires a collective and integrated effort among the different public sector and institutional actors to tackle the many policy levers (i.e. education, employment, labour and industry, social, economic and fiscal) that affect career lifecycles. Consequently, HR planning also requires the collaborative effort between government, the private sector, the education and training sector, including labour and industrial associations within the country.

A framework for human resources planning at a national level typically consists of several processes including: needs-based analysis, policy planning and decision making, development of required human resources, policies, action planning, implementation and monitoring & evaluation.

The ability to predict future needs based on current and emerging trends is an essential output of the HR Planning Framework. Benefits from the use of forecasting in human resources planning include:

⁷¹ This is Gross Expenditure on Research and Development

1. Achieving labour market balance;
2. Reducing adjustment costs;
3. Increasing productivity and efficiency;
4. Reducing social and economic problems arising from labour market imbalances;
5. Ensuring that workers are employed in occupations that correspond to their skill level resulting in significant productivity and efficiency gains; and
6. Improving personal and public investment decisions, particularly pertaining to investments in education and training.

In taking a coordinated approach to planning the skills required per sector, each sector organisation is required to understand the future demand for skills and take proactive steps to improve workforce planning and also take a coordinated approach towards addressing workforce challenges at the planning stage.

4.5 Mechanism for Determining Manpower Needs

Determining labour demand and supply are essential components of any Human Resource Planning framework. An HR framework at the national level should be based on the Government's programme of action for priority projects outlined in the GIP.

According to the Canada Public Service Agency, Integrated HR and Business Planning is the foundation for assessing and understanding the current and future needs of departments, agencies, and the public service as a whole. For planning at the national level to be integrated and achieve its intended purpose, it has to be information driven; where planning processes and decisions are based on factual and timely information on current and future needs (demographic data, environmental scans, employee feedback, labour market information, etc.). Planning at this level is beneficial as it helps to identify the risks and challenges that may come up during implementation, and outlines options to mitigate such critical issues. Regular reporting on integrated planning takes place, and processes are established across the public sector to monitor, measure, and evaluate the effectiveness of the HR Plan.

Manpower needs refer to the demand for human resources and the supply that exists to meet those needs when required. Demand, in the context of the GIP, refers to the number of workers or skilled labour required per sector or project. By definition it includes the number of workers already employed in various sectors of the economy as well as the number of vacant positions available for this occupational group. The ability to accurately make forecasts for the demand of new skills due to a variety of developmental dynamics is an essential basis for identifying the supply that exists.

Three important factors to consider in order to successfully determine manpower needs include:

1. The identification of stakeholders (i.e. HR Planning team) who will be involved;
2. Definition of the appropriate planning timeframe; and
3. A definition of the internal and external labour force.

In developing an HR Plan at the national level, it is important to consider the composition of the HR Planning team for determining the manpower needs. For the GIP, this team should include representatives and relevant stakeholders across multiple functional areas and sectors of government. Developing a team for the HR Planning process helps to

ensure the success of the strategies within the GIP and allows for accountability during implementation. Sector Leads as well as HR Planning Leads from labour and workforce divisions of government must understand the value of the HR plan to the successful implementation of plans outlined in the GIP. It is critical not only to align the HR plan to the strategic objectives of the GIP but also communicate how the plan will affect future operations, financial goals, and economic position of the country.

The role of the HR Planning team will mainly include among others, the responsibility of:

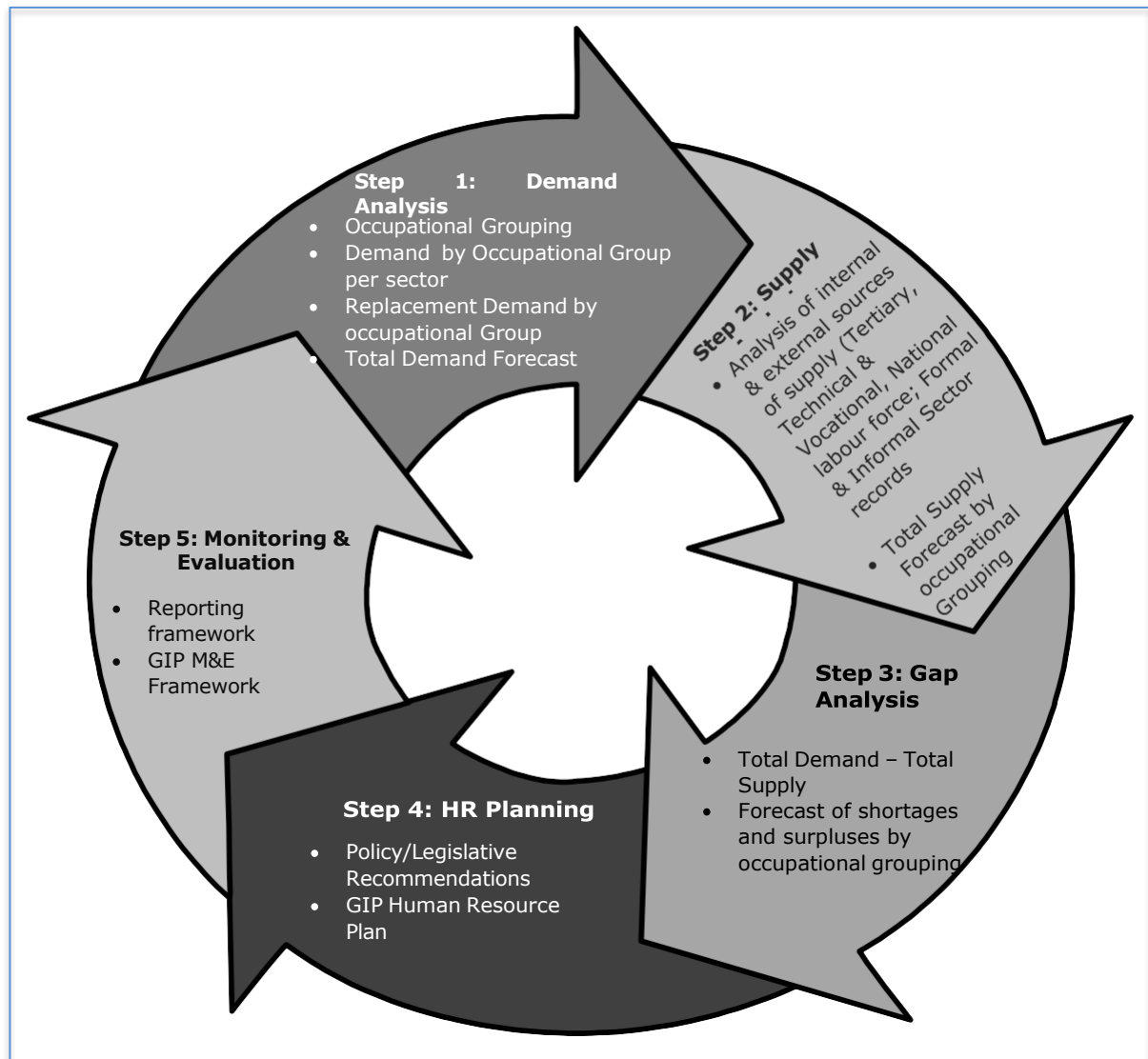
1. Helping to identify and anticipate risks and problems early and providing mitigation outcomes to avoid disruptions and costs;
2. Facilitating quick and efficient procurement of labour/skills replacement without adversely affecting sector operations;
3. Providing industry and sector insight to reduce the effects of fluctuating business cycles and helping the state better withstand the peaks and troughs of business, i.e. dynamics of government, policies and processes;
4. Help secure the right staff and help identify training needs and employee development initiatives; and
5. Help secure the right skills, both in quality and quantity as well as to provide sector relevant input into identifying developmental and training needs.

4.6 The HR Planning Framework

The framework outlines a 5-step approach from the demand and supply analyses stage, to the identification of Gaps in HR planning and finally to monitor performance and evaluate the effectiveness of the plan. A mechanism for developing the HR Plan and key considerations to be made at both the national and sectoral levels to ensure/enhance the success of each human resource planning intervention has also been defined. Key is the need for Ghana to adopt an approach that is more long term but with specific timelines for reviewing each plan and revising the approach based on prevailing circumstances. The ability of the plan to remain sustainable through changes in government is to ensure that the HR plan is backed by legislation and policies that mandate all sectors and key government institutions to properly undertake an analysis of occupational groups vis-à-vis the infrastructure plans per sector, and effectively outline a plan for addressing the human resource requirements.

The proposed framework for the HR Planning for the GIP is a 5-step approach that can be adopted to determine current and future human resourcing needs for the GIP. The major steps for determining demand and supply, followed by a detailed analysis to identify the gaps between the short to long-term skill requirement needs as well as the actual planning process and the monitoring and evaluation processes, have been clearly outlined.

Figure 4.1: HR Planning Framework



Source: Author's Construct

Step 1: Demand Analysis

A solid understanding of the skills needs of the GIP, the government, and on-going sectoral priorities, as well as emerging changes and trends, and the impact of legislations on labour, are first steps to define the skills demands of the various infrastructural projects under the GIP. This step, therefore involves a consideration of needs at the project level, which is consolidated into the skills requirement for developing infrastructure at the national level.

Other considerations to be clearly defined at the demand analyses phase include whether to form strategic partnerships (to facilitate business and HR planning/workforce planning efforts) or otherwise, and ensuring that accountability requirements are met.

The institution responsible for identifying the skills per sector will adopt an approach to identify current and emerging labour trends based on factors such as demographics, cultural and geographic factors. The ability of the responsible body to forecast future

Human Resource needs, including the type of skill with their corresponding numbers, is especially helpful at this stage.

The primary outcome of the demand analysis phase, which is the ability of each sector to adequately define the amount of human resource required to implement developmental projects as and when they are planned to commence within the 40 year period of the GIP, must not be overlooked. Given considerations to labour dynamics peculiar to the various sectors, analysis of demand will be impacted by variables like economic growth or decline, variables in skills availability, etc. These must all be considered when forecasting demand over a long period, as is the case with the GIP.

To make the best use of data in relation to development goals, it is important to involve key stakeholders in the process of planning at the data collection and input stage to conduct demand and supply assessments. The involvement of key sectors will create more opportunity for data accuracy to obtain more reliable forecasts.

Another major feature of the demand analysis phase, which is often overlooked, is the Replacement demand. In particular, for defining the potential of newcomers on the labour market and an ageing workforce, critical analysis and planning for replacement demand is important. Contingency plans, based on thorough analysis of the factors and timelines attributing to the need for future demands are necessary for the skills planning institution to be able to plan and forecast for replacement demand.

According to the Human Resource Management and Policy Manual for the Ghana Public Services, a key component of the demand analysis phase (i.e. workforce analysis) is, understanding the workforce and planning for projected shortages and surpluses in specific occupations and skills sets. The Manual listed the following employment information as critical for the analysis to be conducted for various occupational categories:

1. Retirement, post retirement, length of service, employment type, leave usage, reasons for leaving, absenteeism, grievances, transfers;
2. Skills and competencies (for example training and learning data, performance management data, language competencies); and
3. Internal workforce trends; for example eligibility for retirement, vacancy rates, turnover rates, internal staff mobility such as deployments through posting, job rotation, promotions, secondments and engagement of casual workers, national service persons and interns, etc.

The overall objective of the HR Plan for the GIP, which is to come out with a total demand forecast that ensures the provision of qualified and adequately trained professionals to implement the developmental projects for the next 40 years, must be well articulated to ensure the reliability of the data projections that will be made at this stage by the various sectors.

The starting point for the Demand Analysis is based on the number of staff (i.e. skills) that is currently available in a country – not on the numbers required. The Demand Analysis must identify not only the numbers of staff needed (Staffing Assessment), but also the competencies that are critical to successful job performance (Competency Assessment).

The focus of the Demand Analysis is to identify the functions that a sector or government agency must perform; and not just the people needed to carry out the functions. The Demand Analysis should also examine changes in functions across project life cycles (these can be determined by sector representatives and experts in the HR Planning team). These changes might have a significant impact on the size and kind of workforce needed in the future.

Once the staff classifications to target are decided, there is the need to conduct both a Staffing and Competency Assessment, in order to get a full understanding of the workforce.

In projecting future staffing needs, consider:

1. **Policy Changes/New Initiatives:** New programme initiatives or “reforms” may have significant staffing implications. E.g. Policy reforms or changes to education, skills development and sector operations may all have direct and indirect impact on the timing and availability of skill for project roll out.
2. **Mandated Regulatory Changes:** Work requirements can change as a result of state or local requirements. Legislative orders and parliamentary acts may require new collective bargaining agreements, and sometimes mandate staffing levels or workload limitations.
3. **Planned Growth/Expansion:** The demand for skills may change as a result of population shifts, unemployment rates, or any of the many other social issues that affect the demand for human resources.
4. **Other Factors Affecting Staffing:** Any number of other factors may change staffing requirements. Technological innovations may reduce the number of employees needed to do the same amount of work. Staffing ratios may change as a result of available resources and shifting priorities.

Step 2: Supply Analysis

Supply Analysis involves determining the type and number of skills that will be available during the defined timeframes for infrastructural development. The two major sources for analysing supply are internal and external sources. The internal sources focus on the requisite skills that already exist within the labour force and those outside the labour market which are yet to be identified and/or developed.

Internal sources of skills to fill projected vacancies must be monitored. This is facilitated by the use of the human resource audit, or the systematic inventory of the qualifications of existing personnel that are within the labour space. Projections of available skills along the various sectors will be a primary source for determining the availability of skill to implement actions. An analysis of the demographics of existing labour will also be essential to making projections on an ageing workforce, timelines of availability as well as on the monitoring of the HR plan.

Analysis of the external environment will focus on identifying those external factors that

may affect the labour force capacity, given known infrastructural and national needs and emerging issues. An external scan should consider the opportunities that exist, which can be advantageous to each sector, and the availability or lack of skill. Current workforce trends; supply of employees in certain occupations; candidate pools; current and projected economic conditions; technological advancements which could create new employment or negatively impact certain occupations or positions; migration patterns; in-take for occupational groups at tertiary institutions as well as employment practices are all avenues that will be considered in analysing supply. It is important to emphasise that the availability, qualification as well as an understanding of skills and competency levels are required to enable an accurate and reliable forecast of skills supply.

An understanding of the internal and external labour dynamics and factors will enable the GIP to plan more effectively for the future and prioritise sectors where the needs are most pressing. For example, the NDPC can make informed decisions and recommendations on which education and training programmes should be offered (as new programmes), which ones should be expanded, and which ones should be phased out or modernised to fit the needs of an evolving employment market.

In the supply analysis for national infrastructure development, the HR planning process will focus on the current staffing level in the targeted occupational groups; and identify all the personnel actions that can impact future staffing levels (retirements, resignations, terminations, promotions, demotions, transfers, etc.). The following should also be factored in when projecting future staffing levels:

1. **Demographic Data:** It is helpful to prepare a spreadsheet to document demographic information by classification and organisational unit. Such reports provide an overview of the diversity of the current and available workforce, and may suggest issues that need to be addressed.
2. **Retirement Eligibility Data:** Every sector and government agency engaging in Workforce Planning should pay close attention to retirement eligibility data. Institutions should analyse their retirement eligibility data by classification and department (organisational unit) to identify the areas of greatest vulnerability.
3. **Educational Background Data:** It is also very useful to analyse the educational level and degrees/majors of employees by occupational grouping.
4. **Vacancy Data:** Institutions can use templates to complete a point-in-time assessment of the number and percentage of vacancies in all or selected occupational groupings. By repeating the point-in-time assessments for different time periods, the HR planning team or unit will be able to use the data to determine average vacancy rate. Advancements in technology have also made available automated systems that can track the length of time it takes to fill vacancies.

Step 3: Gap Analysis

To establish the dynamics between the supply and demand for skills, the two are compared in order to identify the gaps in skill, competency and numbers. Current and future skill requirements need to be projected based on an analysis of project goals and priorities, as well as on outcomes of the supply and demand analysis. Questions that are

helpful in determining HR needs, identifying gaps, and projecting future HR requirements include the following:

1. What skills shortages in a specific occupational group are likely to occur?
2. What project or programme changes will occur that require the acquisition of new skills?
3. Are there succession plans available for critical positions to ensure project continuity?
4. What job family, job function, job role, skill and capability shortages and surpluses currently exist per sector?
5. What job family, job function, job role, skill and capability shortages and surpluses are expected to appear in the future?
6. What is the gap between the current demand and future demand per occupational group?
7. What is the gap between the current supply and future demand per occupational group?
8. Which are the most critical gaps now and over the forecast period?
9. When are the most critical gaps?
10. Which are likely to be the most critical gaps in the future?

When designing strategies to respond to demand and supply gaps it is also crucial to take into account the informal sector and how to develop the essential skills available. This, however, requires the availability of reliable data. Results will also guide government policies and decisions on dealing with labour market issues/challenges such as deciding to make greater investments in specific human resources development projects/activities that will enhance development of a particular industry or generate employment in a particular region of the country. Strategies and targets designed to respond to demand gaps need to prioritise the sectors where shortages are likely to be more prominent.

A policy consideration for any public service set up or organisation at the gap analysis phase is to determine the human resource needs with the following considerations:

1. Possible skills shortage or excess in specific occupational groups;
2. Whether changes in programme delivery require the acquisition of new skills;
3. Availability of qualified staff at all levels;
4. Whether employment diversity obligations have been met (gender and disability);
5. Any risk or threat associated with the environmental scan.

Step 4: HR Planning

Subsequent to an examination of the gap analysis outcomes, HR priorities should be determined and the strategies needed to achieve desired outcomes must be identified per sector. Strategies and policies are all key interventions at this stage. Plans to develop a talent pool through the educational system are crucial to developing skills and capacity. Work environment improvements to maintain the current workforce and develop critical skills, and plans for sourcing and recruiting requisite skills are relevant at this stage. Recommendations for new policies or legislation for developing skill and growing national capacity in specific sectors will be determined at the HR Planning Stage.

The HR Plan will outline a forecast of demand and supply of skill per sector. The plan will

aggregate the numbers (i.e. a count of manpower/skilled personnel) that will be required within the HR Plan timeframe. Typically, the role of the NDPC at this stage will be to develop a comprehensive HR Plan that outlines plans for resourcing, developing and retaining key skills throughout the life of projects by sector.

In determining and planning for skills needed in the GIP, there is the need for research to be conducted into the various infrastructure sectors to develop a Sector Skills Plan (SSP) for Ghana's development in the short, medium and long term.

At the HR Planning phase, the role of the NDPC or the HR representative will be to ensure the formulation of broad policy objectives, financing, governance models and strategies relating to human resource development in the country. Mobilisation of funding for HR development will facilitate the integration of human resources development into national development planning.

Step 5: Monitor & Evaluate

Monitoring, evaluating, and reporting on HR performance outcomes is key to assessing progress in target areas and to determining future priorities on the plan. Under this particular step, considerations are made for having a clear and measurable set of HR goals. Also, performance measures for tracking and recording success are well aligned.

It is also important to consider the existence of systems in place to track performance indicators and analyse costs and benefits of the plan for on-going and proposed projects.

Determining how the results from performance indicators will inform plans for upcoming projects as well as setting priorities in moving forward, is an essential output of the monitoring and evaluation phase. Definitions of success must be clearly set and communicated at this stage of the process.

Some key elements needed to undertake this step include:

1. Monitoring of the workforce; and
2. Confirmation that:
 - a. The workforce drivers are still the same as when the HR Plans were developed;
 - b. The supply and demand forecasts are being tracked as expected;
 - c. The workforce plan implementation is progressing;
 - d. The workforce is regularly evaluated, that is, as to whether planning strategies and initiatives are achieving the desired business performance outcomes; and
 - e. The sector workforce plan is reviewed and adjusted to reflect necessary changes identified in the monitoring and evaluation process.

It is important to define Key Performance Indicators (KPIs) against which the progress of the workforce plan will be monitored and evaluated. By monitoring KPIs, it will be possible to identify changes and developments in the workforce; and this will inform the workforce plan evaluation and review. Examples of KPIs to measure will include:

1. Workload increases and decreases;
2. Workforce age profile;

3. Resignations and other employment termination issues;
4. New policies and proposals; and
5. Portfolio budget statements.

It is also necessary to monitor the progress of the HR Plan implementation to ensure that proposed initiatives are delivered on time and within budget. The purpose of the evaluation is to understand whether the sector plans have succeeded in addressing identified workforce gaps. Looking at specific strategies and initiatives, and whether these have been effective, will enable improvements in subsequent HR plans.

4.7 Maintaining a Sustainable Workforce

There is a huge potential for Ghana in executing significant infrastructural projects. The establishment of the Ghana Infrastructure Investment Fund (GIIF) shows the level of importance attached to infrastructure development in the country. In order to make the most of this development, there is a need to ensure that the appropriate manpower is available at all times to deliver on these infrastructure projects.

Maintaining a sustainable workforce in the Ghanaian infrastructure sector is necessary to ensure a constant stream of manpower. The foremost challenge in this field, is the lack of information to collate and assess the depth of skills and the issues relating to its availability (including underutilised and unutilised skills), gaps and mismatches in many low – lower middle income countries. It has been recommended that greater investments be channelled into physical infrastructure projects⁷² to build and sustain domestic capacity.

This would also make the industry attractive to new entrants and possible entrants or personnel from competitive industries like the physical sciences, banking and insurance, etc. Wright et al., (2013) iterate that the industry's capacity is currently low in Sub-Saharan Africa (SSA) because of poor industry-specific (e.g. engineering) education; "brain drain" of talent to other sectors and countries; and lack of recognition that benefits of investing in physical infrastructure do not only proceed from the built assets and services delivered but also include the socio-economic benefits associated with the construction and maintenance of those assets. Other suggestions for sustainable workforce are demarcated into the following subheadings: government; international agencies; industry; and institutions.

Government

1. Invest in research to map infrastructural capacity in the country;
2. Create and manage a database on the supply of qualified human resources from universities, polytechnics, technical colleges and vocational training centres;
3. Disseminate this information regularly via journals and all public websites;
4. Develop and enforce industrial policies such as local content requirements, and infrastructure investment to create jobs, promote enterprise development and advance skills training;
5. Establish and enforce a statutory requirement for professionals to register;
6. Provide resources to improve educational institutions and training centres;

⁷² Holly Wright et al., Engineering Capacity Needs in Sub-saharan Africa. The Africa Infrastructure Investment Report. (London: Commonwealth Business Communications Limited, 2013), 21.

7. Create avenues for on-the-job training and internship;
8. Develop and enforce policies to limit “brain-drain”;
9. Institutionalise human resources planning; and
10. Create the environment and promote local content in procurement and contracts execution.

International agencies

1. Invest in research to map infrastructure capacity needs and existing capacity building support;
2. Integrate capacity building components in all infrastructure investments; and
3. Procure from domestic sources.

Industry

1. Build stronger links with educational institutions to ensure that graduates are equipped with skills and knowledge that are required by the industry;
2. Collate data on skills in the industry that are mandatory for all;
3. Ensure the enforcement of regulations, i.e. local content laws. This is to ensure foreign infrastructure firms utilise local skills, in order to enhance knowledge-transfer from foreign to local engineers, for instance;
4. List and prioritise critical occupational skills; and
5. Create an industry skills’ monitoring and evaluation system.

Institutions

1. Routinely review and update technical courses at the universities to ensure that they meet industry requirements;
2. Liaise with the industry for investments in faculties that do not have the requisite resources to provide appropriate laboratory or on-site experience;
3. Create research centres to help solve industry and infrastructural challenges; and
4. Create an avenue to recognise or reward academic staff. This is to discourage too many consultancy jobs due to low salaries.

Additionally, the sustainability of the workforce will be dependent on aligning the human resource plan with the Ghana Education Strategic Plan (ESP) for the 2010-2020 period. This ESP which is the 5th Education Strategic Plan is guided by policy initiatives that emerged in the years following the publication of the previous ESP in May 2003; most notably the National Education Reform (NERIC, 2007) and resulting 2008 Education Act, both of which were guided by the revised Growth and Poverty Reduction Strategy, 2006-09 (GPRSII). In addition, there have been numerous significant sub-sector policy reforms. In 2009 the incoming government introduced a number of education sector policy initiatives, which are important policy drivers for the ESP. Although guided by a number of principles, the essential one that underpins this strategy is the ability of the education sector to ensure universal access to 11 years of quality basic education with increased, affordable, equitable access to senior and tertiary education. Therefore, it is essential how the plans for developing required skills for implementing the GIP from now to 2020 are aligned to this strategic underpinning.

In the case of Korea, for example, sustainability of the workforce required action plans to clearly specify both sub-plans and related plans and show the scope of the work and the quantity of the materials in detail. Plans must, therefore, also specify the policy-

driving subject, the budget, strategies to secure financing, and investment plans, so as to ensure stable resource mobilisation. During or after the process of policy materialisation, examination, and evaluation to confirm whether policies have been faithfully conducted, what is written in the reference guide for the original plan must be followed, and the performed activities must be corrected if necessary. There are both monitoring processes and evaluation processes. Monitoring measures the output of the activities—in other words, the completion of construction work on a reservoir, the number of cured elders, the number of consulted school boys and girls, etc. Evaluation measures whether the activities were conducted according to the procedures specified in the policy guide⁷³.

4.8 Funding Strategies

Sahoo et al., (2015) postulate that there is no singularly appropriate model to finance infrastructure. An ideal model would have to reflect the characteristics of the infrastructure, where the investment is needed, as well as the state and financial markets of the economy; and the model should evolve as the economy matures and industries develop (ibid). For example, for low income countries where development is a priority but economies are small, domestic financial solutions are infeasible, and internal markets are weak. Generally, it is recommended that countries should introduce and prioritise innovative risk-sharing instruments to national capital markets, since this could attract investments by institutional investors (ibid).

For a lower-middle income country like Ghana, a combination of a centralised government cum international institutions and a decentralised (multiple state-owned and private institutions) at varying degrees, depending on the type of infrastructure, should primarily guide the source of funding. For example whilst transportation could be financed via Public Private Partnership (PPP), nuclear energy may require more of government or a centralised source of funding. The latter is because of high capital/construction cost, highly regulated electricity marketing, potential late project delivery and over-budgeting, and economies of scale from having large civil engineering projects as well as licensing and insurance that are always virtually borne by government.

In essence, the following should be considered when searching for funds for the HR of the selected infrastructure projects:

1. Ascertain the size of the infrastructure project;
2. Define the main human resource needs of each infrastructure project;
3. Establish the number of expertise currently functional in the country;
4. Determine other sources of supply, that is from outside the country, and how to procure their services in case of insufficient number in-house;
5. Note and understand the quality of previous work done and experience gained over time by the current personnel;
6. Understand current national policies, programmes and the various developmental goals as well as the need for more and improved human capacity to achieve the country's objectives;

⁷³ A Comparative Study of National Human Resource Development Plan Implementation Systems in Korea, the United States, and Japan, Shin Bok Kim et al.

7. Identify plausible sources of funds; and research the policies, programmes, priorities of these donors;
8. Make initial contact with the selected donors to specify the infrastructure plan and requisite human resource, the need for support, and the counterpart input should the funds be obtained;
9. Develop a proposal and among other things, indicate Government's interest and support to the projects, identify potential obstacles and suggest plausible solutions;
10. Submit the proposal or request for aid formally, following the outlined process of the donors;
11. Check progress of the request and act accordingly; and
12. Finish formal agreement processes if approved.

4.9 Potential Sources of Funds (HR Inclusive)

This sub-section internalises the various requisite human resources, since technical assistance usually given by donors also involves knowledge transfers and training, among other things. There are several ways by which funds could be procured for infrastructural improvement; including aid, with requisite skills or capacity building in the sector. The major sources of funds to support HR in infrastructure include government budgeting; public-private partnership (PPP); multilateral institutions including development banks; bilateral agencies; the Organisation for Economic Cooperation and Development (OECD); and the overseas official development assistance programmes of national governments.

Government Financing

Governments usually undertake major infrastructural projects to aid growth and development in a country. Funds for such projects are normally acquired through the national budget, which also receives support from International Financial Institutions (IFI) like the World Bank and African Development Bank (AfDB).

Public-Private Partnership (PPP)

This type of funding is becoming hugely popular, especially in SSA. Governments that face challenges with meeting the demands of new and improved infrastructure due to insufficient financial support from traditional donors, form partnerships with the private sector to solicit not only for funds but also technical assistance. Funds from the partnership are used mainly in the transport, water and sanitation, as well as the energy sectors.

Multilateral Institutions/ Development Banks

These institutions pool resources from interested donors and provide technical and commodity assistance through cash grants, commodity transfers, technical assistance, or loans. They are also sector-focused, particularly those that relate to economic development. The institutions include the World Bank, the regional development banks⁷⁴ and the United Nations Development Programme (UNDP). Infrastructure projects these

⁷⁴ The World Bank, International Fund for Agricultural Development, European Investment Bank, Islamic Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, CAF-Development Bank of Latin America, Inter-American Development Bank Group, African Development Bank and Asian Infrastructure Investment Bank.

institutions/banks might fund include transportation, water and sanitation, energy and telecommunications.

Bilateral Institutions

These institutions operate on a government-to-government level where there are exchanges of goods and funding on grant bases. They sometimes operate in countries through organisations contracted to give technical assistance to planned or on-going projects. An example is USAID that funds the design and construction of roads (especially feeder roads), schools, health facilities, communications, water, and energy infrastructure in many developing countries. One of the primary objectives of the Agency is to improve economic growth and stability. Additionally, to ensure the sustainability of the projects, the Agency guides local institutions on how the infrastructure should be managed and subsequently operated.

Infrastructure Funds

There is currently a new approach to infrastructure financing especially for Africa and emerging countries. One is the Public Private Infrastructure Advancement Fund (PPIAF), which provides annual financial aid in technical assistance to emerging market governments. This is to encourage private involvement in infrastructure development in water and sanitation, transport, power, and telecommunications as well as efforts to ascertain and disseminate best practice in the area. Countries that contribute to the fund comprise Japan, France, Germany, the UK, Sweden, Canada, Norway, the Netherlands, the World Bank, Switzerland, UNDP and the Asian Development Bank.

Other infrastructure funds include:

1. **The Emerging Africa Infrastructure Fund (EAIF):** This was established to provide long-term debt finance to commercially viable private-sector infrastructure projects in Sub-Saharan African countries; except South Africa and Mauritius. The main mandate of the fund is to co-finance with other international and regional or local lending institutions to stimulate funding.
2. **The EU-Africa Infrastructure Trust Fund (EU-AITF):** The European Commission and the European Union Member States created this trust fund in 2007 to increase investment in infrastructure in Africa. This fund combines long-term loan financing with grant resources from the Member States. Infrastructural projects such as energy, transport, water, and ICT qualify to receive financial support from this Trust Fund.
3. **The African Development Fund (ADF):** Owned by the African Development Bank (AfDB), this fund supports transport, energy and ICT development in Africa. The projects should however be majority-owned by private sector investors (ie. more than 51%) or publicly owned with strong financial standing and proven managerial autonomy.

Non-Traditional/Emerging Markets

These include the Chinese Infrastructural Funding (CIF), the Arab Funds, and others such as funds from Brazil, India, and Turkey. The funds from China for instance fill gaps that are not met by Official Development Fund (ODF) or the private sector. They also contribute to investments in transport, energy, telecommunications, water supply and

sanitation.

Others

A new channel for sourcing funds for various projects is currently emerging in lower to middle-income countries. This channel uses innovative ways to acquire financial backing or support for mainly infrastructure development in these recipient countries. An example is the Resource-for-infrastructure (Rfi) financing, where future mineral or oil revenues support project financing. Payments are usually taken from export credit (the World Bank, 2013). Typical projects funded using this approach include roads, railways, telecommunications and hydropower dams.

APPENDIX A: Updated GIP Team

No.	Name	Designation	Institution	Role
Team Leadership and Coordination				
1.	Ing. Charles Boakye	Team Leader	Institute for Infrastructure Development	Leadership
2.	Mr. Andrews Dwamena	Coordinator	Institute for Infrastructure Development	Active
3.	Ms. Annie Baisie	Research Officer	Institute for Infrastructure Development	Active
4.	Ms. Yvonne Abakumah Acheampong	Graphic Designer	Institute for Infrastructure Development	Active
Energy Sector				
5.	Dr. Ben Asante	Consultant	Petroleum Specialist	Leadership
6.	Mr. Mawunyo Dzobo	Government Sector Expert	Energy Commission	Leadership
7.	Dr. Joseph Essandoh-Yeddu	Government Sector Expert	Energy Commission	Co-Leadership
8.	Mr. Wisdom Togobo	Government Sector Expert	Ministry of Power	Active
9.	Mr. Isaac Ennison	Government Sector Expert	Ghana Atomic Energy Commission	Active
10.	Dr. Stephen Yamoah	Government Sector Expert	Ghana Atomic Energy Commission	Active
11.	Dr. Nii Allotey	Government Sector Expert	Ghana Atomic Energy Commission	Active
12.	Dr. Seth Debrah	Government Sector Expert	Ghana Atomic Energy Commission	Active
13.	Ing. Ben K. Ntsin	Government Sector Expert	Ghana Grid Company Ltd	Active
14.	Ing. Godfred Mensah	Government Sector Expert	Electricity Company of Ghana	Active
15.	Mr. Stephen Akrong	Government Sector Expert	Ghana National Petroleum Corporation	Active
16.	Mr. Joseph Wilson	Government Sector Expert	National Petroleum Authority	Active
17.	Mr. Seth Mawu	Government Sector Expert	Ministry of Power	Active
18.	Mr. Ato Amissah Wilson	Government Sector Expert	Bulk Oil Storage and Transportation Ltd	Active
19.	Mr. Isaac Eshun	Government Sector Expert	Petroleum Commission	Active
20.	Mr. Andrew Adu	Government Sector Expert	Ghana National Gas Company	Active
Transport Sector				
21.	Dr. John Bernard Koranteng-Yorke	Consultant	Road Transport Specialist	Leadership
22.	Mr. Sam Barnes	Consultant	Railway Specialist	Active
23.	Mr. Emmanuel Nelson-Coffie	Consultant	Inland Water Transport	Active
24.	Mr. Siisi Ocran	Government Sector Expert	Ministry of Transport	Expert/Quality Review
25.	Mr. Kwasi Agyeman Boakye	Government Sector Expert	Ministry of Roads and Highways	Active
26.	Mr. Akwesi Agyeibi	Government Sector Expert	Ministry of Transport	Active
27.	Mr. Sitso Addo	Government Sector Expert	Ghana Highway Authority	Active
28.	Ing. Joseph Yeboah	Government Sector Expert	Ghana Highway Authority	Active

No.	Name	Designation	Institution	Role
		Expert		
29.	Ing. Mrs. Akua Sakyibea Vander-Pallen	Government Sector Expert	Department of Urban Roads	Active
30.	Mr. R.O. Otoo	Government Sector Expert	Department of Feeder Roads	Active
31.	Mr. Komla Ofori	Government Sector Expert	Ghana Ports and Harbours Authority	Active
32.	Mr. Edward Forson	Government Sector Expert	Ghana Airport Company Limited	Active
33.	Mr. Laud L. Quansah	Government Sector Expert	Ghana Railway Development Authority	Active
34.	Ing. David Adonteng	Government Sector Expert	National Road Safety Commission	Active
Information and Communication (ICT) Sector Team				
35.	Dr. John Effah	Consultant	ICT Specialist	Leadership
36.	Mr. Desmond Boateng	Government Sector Expert	Ministry of Communication	Active
37.	Mr. Austin Hesse	Government Sector Expert	Ministry of Communication	Active
38.	Mr. Eric Akumiah	Government Sector Expert	National Information Technology Authority	Active
Water, Integrated Waste Management, Irrigation Team				
39.	Ing. William Freebody Acquah	Consultant	Water Supply Specialist	Leadership
40.	Ing. Collins Annoh	Consultant	Integrated Waste Management Systems Specialist	Co-Leadership
41.	Ing. Wise Ametefe	Consultant	Drainage, Flood Control and Coastal Protection Specialist	Active
42.	Mr. Ben Ampomah	Government Sector Expert	Water Resources Commission	Active
43.	Mr. Enoch Asare	Government Sector Expert	Water Resources Commission	Active
44.	Ing. Wilson K. Darkwah	Government Sector Expert	Ghana Irrigation Development Authority	Active
45.	Ing. Kofi Modzaka	Government Sector Expert	Ghana Irrigation Development Authority	Active
46.	Ing. Richard Appiah Otoo	Government Sector Expert	Ghana Water Company Limited	Active
47.	Mr. Emmanuel Gaze	Government Sector Expert	Community Water and Sanitation Agency	Active
48.	Ing. Henrietta Osei-Tutu	Government Sector Expert	Ministry of Local Government and Rural Development	Active
Spatial Planning, Human Settlements and Shelter Systems				
49.	Dr. K. Ohene Sarfoh	Consultant	Human Settlement and Shelter Specialist	Leadership
50.	Arc. J.G.K. Abankwah	Consultant	Housing Specialist	Active
51.	Arc. Richard Nii Dadey	Consultant	Social, Civic and Commercial Specialist	Active
52.	Dr. Theresa Tufuor	Government Sector Expert	MWRWH	Active
53.	Mr. Kekeli Amedzro	Government Sector Expert	Town and Country Planning Department	Active
Construction Sector Team				
54.	Surv. Kwadwo Osei Asante	Consultant	Construction Industry Development Specialist	Active

No.	Name	Designation	Institution	Role
55.	Ing. John Tettey	Government Sector Expert	Ministry of Water Resources Works and Housing	Active
Climate Change and Environment Team				
56.	Dr. Adelina Mensah	Consultant	Climate Resilience and Strategic Environmental Assessment (SEA) Specialist	Leadership
57.	Ms. Cindy Badoe	Government Sector Expert	Environmental Protection Agency	Active
Economics and Finance Team				
58.	Prof. Anthony Q.Q. Aboagye	Consultant	Financial Specialist	Active
59.	Dr. Gheysika Agambila	Consultant	Economist	Active
60.	Mr. Osei Agyeman-Badu	Government Sector Expert	Ministry of Finance	Active
61.	EY Ghana	Consultant	Human Resource Planning Specialist	Active
62.	Dr. Andrew Asibey	Consultant	Monitoring and Evaluation Specialist	Active
63.	Mr. Isaac Neequaye	Consultant	Quality Assurance Specialist	Active
64.	CERSGIS	Consultant	Geographic Information Systems (GIS) Specialist	Active

LEGEND

	Consultant
	Government Sector Expert

APPENDIX B: Definition of Terms

Term	Definition
General	
Population	All residents regardless of legal status or citizenship, except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin
Urbanisation Rate	The exponential change in urban population for a given period
Deforestation	The permanent conversion of natural forest area to other uses, including shifting cultivation, permanent agriculture, ranching, settlements, and infrastructure development. Deforested areas do not include areas logged but intended for regeneration or areas degraded by fuel wood gathering, acid precipitation, or forest fires. Negative numbers indicate an increase in forest areas. (Food And Agriculture Organisation)
Deforestation Rate	The measure, frequency or extent to which a natural forest area is converted to other uses.
Shelter	
Household	A person or a group of people who live together in the same house or compound, sharing the same housekeeping arrangements and recognize one person as the head of the household. They may not necessarily be related by blood, but belong to a single consumption unit. (PHC, 2010)
Household size	The total number of persons in a household irrespective of age, sex or residential status.
Dwelling Unit	Also referred to as a living quarter, is defined as a specific area or space occupied by a particular household. It does not necessarily refer to the entire house of which the dwelling unit may be a part. (PHC, 2010)
Rooms	Proportions of space within a building, enclosed by walls, a floor and a ceiling, that is partitioned from other areas and is usually meant for lodging.
Secure Housing	Any form of shelter, dwelling unit or lodging, that is: 1. Legal: Has full security of tenure on the land, with proper documentation and registration; 2. Safe: Has stability of construction and secure from the risk of collapse or from natural events like storms, earthquakes and flooding; and 3. Unthreatened: Has no land litigation or ownership disputes; penalties and fines from breaching building codes or lacking development permits; ...and provides adequate services for the protection of the dignity of its occupants.
Slums	A group of individuals living in an urban area and lack one or more of the following: 1. Durable housing of a permanent nature that protects against extreme climate conditions; 2. Sufficient living space which means not more than three people sharing the same room; 3. Easy access to safe water in sufficient amounts at an affordable price; 4. Access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people; 5. Security of tenure that prevents forced evictions. (UN-HABITAT)
Energy	
Generation Capacity	The amount of energy produced by transforming other forms of energy into electricity.
Electric Power Consumption Per Capita	The production of power plants and combined heat and power plants, minus transmission, distribution and transformation losses and own use by heat and power plants plus imports minus exports divided by mid-year population. (International Energy Agency)
Electricity Production/ Generation	This is the amount of electricity produced or generated from different forms of energy (fossil fuels, nuclear power plants, hydro power plants, geothermal systems, solar panels, biofuels, wind, etc). It includes electricity produced in electricity-only plants and in combined heat and power plants. This is commonly expressed in kilowatt-hours (kWh) or megawatt-hours (MWh). (Organisation for Economic Cooperation and Development and Wikipedia)
Electricity Losses	This is the amount of electric energy lost as electricity travels through power lines.
Renewable Energy	The form of energy that is derived from naturally replenished sources that do not get depleted with continual use (eg. Solar, wind, hydro power, geothermal heat etc)
Renewable Energy Stock	The supply or quantity of Renewable Energy sources accumulated or available for future use.
Fresh Water Supply	
Freshwater resources	The total renewable resources, which include flows of rivers and ground water from rainfall in the country, and river flows from other countries. Freshwater resources per capita are calculated using World Bank's population estimates. (The World Resources Institute)
Freshwater withdrawals	The total water withdrawal, not counting evaporation losses from storage basins. Withdrawals also include water from desalination plants in countries where they are significant source. Withdrawals can exceed 100 percent of total renewable resources where extraction from nonrenewable aquifers or desalination plants is considerable or where there

Term	Definition
	is significant water reuse (The World Resource Institute)
Internal Freshwater resources per capita	These include rivers and ground water from rainfall in the country but exclude river flows from other countries, divided by midyear population. (FAO)
Water and Sanitation	
Access to improved water source	Population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, or rainwater collection. Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access is defined as the availability of at least 20 liters a person a day from a source within one kilometer of the dwelling. (WHO; UNICEF)
Access to safe/improved sanitation	Population with adequate access to excreta disposal facilities (private or shared, but not public) that can effectively prevent human, animal and insect contact. Improved facilities range from simple but protected pit latrines to flush toilets with sewerage connection. To be effective, facilities must be correctly constructed and properly maintained. (WHO; UNICEF)
Access to flush toilet	Population with adequate access to a toilet facility (whether for sitting or for squatting) that disposes of human excreta (urine and faeces) by using water to flush it through a drain pipe to another location for disposal, thus maintaining a separation between humans and their excreta. (Wikipedia)
Sewerage Network System	A complex system comprising of pipes, manholes, pumping stations etc. responsible for the removal of waste materials.
Solid Waste	Any garbage, refuse, sludge... and other discarded materials including solid, liquid, semi-solid or contained gaseous material, resulting from industrial, commercial, mining and agricultural operations and from community activities
Telecommunications	
Mobile Telephone subscribers	Subscribers to a public mobile telephone service using cellular technology. (International Telecommunication Union)
Internet users	The people with access to the worldwide network (International Telecommunications Union)
Broadband Subscribers	People with a digital subscriber line, cable modem or other high-speed technology connection to the Internet. (International Telecommunication Union)
Personal Computers	Self-contained computers designed to be used by a single individual. (International Telecommunication Union)
Forests and Agriculture	
Agricultural Land	Arable land, land under permanent crop cultivation (land cultivated with crops that occupy the land for a long time, and need not to be replanted after each harvest, eg. Cocoa, Coffee, Rubber, etc.) and permanent pastures. Land abandoned as a result of shifting cultivation is excluded.
Forest Area	Land under natural or planted stands of trees, whether productive or not. (FAO)
Irrigated Land	Areas purposely provided with water, including land irrigated by controlled flooding. Crop land refers to arable land and land used for permanent crops (FAO)
Transportation	
Road Density	This is the ratio of a country's total road network per the total land area (less area covered by water)
Paved roads	These are roads surfaced with crushed stone (macadam) and hydrocarbon binder or bitumen, with concrete or cobblestones as a percentage of all the country's roads, measured in length. (International Road Federation)
Length of road network	This is the extent of the entire system of interconnected roads designed for vehicular and pedestrian traffic in the country.
Road network in good condition	Proportion of all interconnected roads designed for vehicular and pedestrian traffic in the country, which are motorable all year round.

