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ENGINEERING / TECHNICAL
TRAINING IN GHANA

Ing Dr E B Hagan

Short C.V.

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EXECUTIVE SUMMARY

In anticipation of the 50th anniversary of the independence of our beloved country Ghana, I have selected as the title of my presidential address 50 years of Engineering Development in Ghana.

I intend to trace the development of engineering looking at the institutions available at independence for training engineering professionals. I will also look at the workplaces available for the trained personnel i.e. workplaces ranging from the Public Service (MDAs), Authorities, Corporations, Private Consultancy Services, Research, Armed Forces, Education, Administration, Construction and Manufacturing Industries etc. professional institutions available catering for the interest of the professional engineers and any other class. I will endeavour to track the career progression that existed.

50 years after independence, I intend to repeat the above exercise discussing the same parameters over the period.

I hope to include the role of the World Bank in the total development as pertains to the financial inputs for the development.

I would recognize the impact of the trained professionals on the society and also on the economy.

I hope to postulate on the way forward in the development of engineering vis a vis, human resources development, strengthening regulatory and execution functions, support to construction and consulting firms, focus and support to research institutions and the role of the Ghana Institution of Engineers.

I will finally recommend to the Ghana Institution of Engineers to recognize the contributions made by selected deserving engineers in the fields of Academia, Public Service, Consulting Practice, Construction and Research. I believe we have to celebrate our heroes.

Recognition shall also be given to students who have exhibited the highest of potential towards Engineering Practice.

I shall recommend that the criteria for selection for the award be determined by the Council of the Ghana Institution of Engineers.

ENGINEERING / TECHNICAL TRAINING IN GHANA

Ing K. Sarfo-Debrah
37th President (2006-2007)

1.0 INTRODUCTION

As we look forward to celebrate our nation's 50th independence anniversary, on 6th March 2007, it is pertinent for us Ghanaians in general to take stock of how far we have progressed since independence. For those of us engaged in engineering practice in particular, we need to assess the development of engineering in the period 1957- 2007, to inform ourselves of what pertained then, what we have now and venture into what we hope to see in the near future in relation to engineering development in Ghana.

2.0 BACKGROUND TO ENGINEERING/ TECHNICAL TRAINING IN GHANA

Before Ghana attained independence in 1957 a form of technical training was already in existence. The colonial masters between the 1920's and the 1950's had established the Trade Schools to train craftsmen to build structures and bridges, and to manufacture tools and guns, which were very essential for the wars they fought. These schools were originally located in Accra, Ashanti Mampong, Asuansi and Kibi were added on later with the establishment of another set of four schools at Tarkwa, Takoradi, Kumasi and Kpando as interest in technical training increased among the Gold Coasters. Products from these schools displayed impressive and tangible skills acquired through their training which obviously set them apart among their contemporaries.

The Education Ordinance Bill of 1925 gave technical training adequate legal backing and aimed among other things to:

- encourage and develop manual and practical training for self sufficiency when graduates enter the world of work
- encourage a positive attitude towards manual work among school leavers
- train skilled middle level workers for industry and commerce.

This also brought to the fore the introduction of private technical schools such as Normal Technical School in Koforidua, and the Royal Technical School in Nungua.

The establishment of the Technical Division of Education in 1955 at the recommendation of the Accelerated Development Plan culminated in the 7—year Development Plan after independence which was intended to elevate technical education as a spring board to facilitate Dr. Kwame Nkrumah's vision of turning Ghana into an industrial giant within the shortest possible time. Unfortunately, this was not fully realised before Osagyefo was overthrown in 1966.

2.1 Training of Engineering Professionals

At independence, the Colonial Government had bequeathed to us a legacy of well-structured training programmes across the broad spectrum of engineering professionals commencing with the basic Technical Schools, through the Polytechnics and culminating in degree awarding Institutions in the development of engineering.

There were therefore basically three categories of training institutions. These were the

technical institutes engaging in various levels of competencies.

- Seven technical institutions taking the form of Primary Technical Schools at Accra, Cape Coast, Sekondi, Obuasi, Ktimasi, Koforidua and Ho where middle form three and four pupils were exposed to various aspects of the building and engineering trades such as masonry, wood work, metal work, technical drawing and science.
- A trade training centre in Accra i.e. the Accra Technical Training Centre for craft training on fulltime, block release and evening classes' basis and the
- Nine Technical Institutes at Asuansi, Kikam, Kpandu, Ho, Koforidua, Sunyani, Tamale, Bawku and Kukurantumi which have been absorbed into the public system offering training in craft up to the standard of the Intermediate City and Guilds.

These were followed at the next level for advanced craft and technician training by the:

- Three Polytechnics at Accra, Kumasi and Takoradi.
- School of Mines at Tarkwa, which catered for full-time mining technician courses and craft training for mining apprentices on block release basis.
- Two 'Training of Trainers' Institutions at Kumasi and Ashanti Mampong meant for training technical teachers for Technical Institutions and Continuation schools.
- The only degree awarding Institution at the time - the School of Engineering, which had been established at Kumasi College of Technology in 1952.

2.1.1 Achimota Engineering School

In August 1931, the Colonial Government of the Gold Coast requested Achimota College to organize an engineering course to train Africans for senior appointments in the Public Works Department (PWD), the railways and later, the mines. The course, which was based on the external degree syllabus of the University of London, consisted of four and a half years of study at Achimota, followed by between three and four years of structured practical training. Initially, the course offered at Achimota led to degrees in electrical, mechanical and civil engineering, but with the expansion of activities in the mining sector in the Gold Coast, it became necessary for the School to expand its course offerings to include mining engineering. In addition to the possession of the basic academic qualification of either direct matriculation or by exemption from the Cambridge School Certificate, the Principal, Charles Deakin, insisted that the applicants demonstrated aptitude for engineering by undertaking a six-month industrial attachment to the railways, the mines or the PWD. The evaluation of the report on this attachment and an interview formed the basis of selection.

By 1933, five (5) students were enrolled on the engineering course, but apparently most of them abandoned the course, either preferring to continue their engineering courses overseas or changing courses. In July 1935, the only candidate still on the B. Sc. (Eng) course, Mr. Robert Patrick Baffour, graduated in Mechanical Engineering. The late Dr. R. P. Baffour, of course, became the first Vice-Chancellor of the Kwame Nkrumah University of Science and Technology (KNUST).

Prominent among the engineers who graduated after Mr. R. P. Baffour are the following:

DeGraft-Johnson (Mech. Eng) First African Head of the Railways Corporation

- Lawrence Apaloo (Civil Eng) Formerly of PWD and later Permanent Secretary of Ministry of Works & Housing
- E. M. Koram (Elect. Eng) Former Head of Posts & Telecommunications (P &T)
- Alfred Otoo (Civil Eng) First head of Ghana Ports and Harbours. He also built many secondary schools in the 1960s
- J. S. Annan (Elect. Eng) The first organizer of the Trade Union Congress (TUC) in Ghana while working for railways. He was Principal Secretary to many Ministries including Defence, Health and Agriculture and ended up as Assistant Director-General in the Food & Agriculture Organization (FAO) in Rome
- James Torto (Mech. Eng) Former Head of Technical Education in the Ministry of Education
- Emmanuel Lartey (Civil Eng)- First African City Engineer of PWD and First Director-General of Centre for Scientific and Industrial Research (CSIR)
- E. L. Quartey (Elect. Eng) Former Chief Executive of Electricity Corporation of Ghana (ECG) and Volta River Authority (VRA)
- Herbert Winful (Elect. Eng) Former City Engineer of Sekondi/Takoradi and later Principal Secretary of Ministry of Works and Housing

First African Geologist to enter the Geological	
	Formerly of P & T
	Former Head of State Transport Corporation (STC)
	Former Chief Engineer of STC
	Former Head of Ghana Broadcasting Corporation (GBC) He later worked with ECA
	First Head of Department of Rural Water Development
	Formerly of PWD
	Who switched to Physical Planning and became the first African Head of

E. A. Mensah (Elect. Eng) Formerly of ECG and later VRA

In spite of acute staffing problems that plagued the Achimota Engineering School, it compelled the

more brilliant students at the time to assist in teaching. Thus, it nevertheless survived and managed to turn out a new crop of graduates, among whom were the following:

Formerly of P & T

2.1.2 School of Engineering in Kumasi

In 1948 the University College of the Gold Coast was established and the University Department of Achimota School was phased off. The new University College was not prepared to accept the Engineering School. No provision had been made for the transfer and this caused the interruption of the training of Engineers between 1948 and 1952.

In 1952 a School of Engineering was established as part of the then Kumasi College of Technology and the facilities and staff of the Achimota Engineering School were transferred to Kumasi. The mining section was transferred to Tarkwa School of mines.

It is interesting to note therefore that at independence in 1957 the School of Engineering was in full bloom and had prepared its students for membership of the various professional institutions in the United Kingdom. In the same year, it started the formal training of graduate engineers of various specializations with the University of London leading to the University of London Bachelor of Science (Engineering) External Degree. The first products of the School of Engineering who were all civil engineers graduated in 1959 with University of London External Degree. They were Ing. Patrick Awotwe who eventually became the first African Head of Department of Civil Engineering and currently a very busy consulting engineer partner in Adnak Consultancy in Kumasi, Ing. Frank Owusu who retired as Deputy Chief Executive of the Ghana Highway Authority (GHA) and the late Ing. Andrew Ohene Safo who rose to the rank of Engineer-in-chief of the PWD.

The School of Engineering metamorphosed in turn to become Faculty of Engineering, and it is currently the College of Engineering with twelve Departments/Programmes under four main faculties:

- I. Faculty of Chemical and Materials Engineering
- II. Faculty of Civil and Geomatic Engineering
- III. Faculty of Electrical and Computer Engineering and '
- IV. Faculty of Mechanical and Agricultural Engineering

2.1.3 University of Mines and Technology, Tarkwa (UMaT)

This University had its origins from the Achimota School of Engineering and it became Tarkwa School of Mines when the Achimota School phased off. It was re-organized into Western University College in 2001.

In November 2004, by an Act of Parliament (ACT 677), UMaT was established with the mission to provide inter alia higher education with special reference to mining and related fields to service the human resource needs from the considerable increase in mining activity in the country. UMaT now offers degree/diploma courses in the Faculties of Engineering and Mineral Resources Technology.

2.1.4 University of Ghana, Legon

The Faculty of Engineering Sciences which has been established in the University of Ghana, Legon offers degree courses in the following:

- Computer Engineering
- Food Process Engineering
- Material Science and Engineering (Ceramics option)

2.1.5 Ghana Telecom University College

One of Ghana's newest universities is the Ghana Telecom University College (GTUC) which is affiliated to the Kwame Nkrumah University of Science and Technology and was formally inaugurated in August 2006 at Tesano, Accra. The GTUC will provide the requisite human resource in the country's information and Communication Technology sector. The College had been run as a training school for technicians of the Ghana Telecom. A total of 300 students were admitted in September, 2006 to do certificate, diploma, degree and post graduate programmes in telecommunication engineering. The products from the college will serve both Ghana and the West Africa sub-region. Enrollment is on fulltime and part-time basis.

The courses offered at the College are:

- Bachelor of Science in Mobile Internet Communication
- Bachelor of Science, Diploma and Certificate in Telecommunication Engineering
- Bachelor of Science and Certificate in Information Technology , Bachelor of Science in Computer Engineering
- Bachelor of Science in Informatics
- Certificate in computer science
- Certificate in computer forensics
- Certificate in Management Information Systems

It is envisaged that the college will in time address the rapid expansion in the field of telecommunications, mobile internet communication, private radio stations and electronic media in the field of provision of technical resource personnel and expertise.

2.1.6 Private Universities

The first private university that offered courses leading to a degree in engineering is All Nations University which began its first classes in 2002 in Koforidua with 37 students. Student enrollment reached 550 by January 2005. The College is in partnership with Karunya Institute of Technology and Sciences Combinatore India.

The other private university offering engineering degree courses is the Regent University College of Science and Technology in Accra.

3.0 EMPLOYMENT AFTER TRAINING AT INDEPENDENCE

The colonial government of Ghana before Independence had designed the country's educational system for the technical products to fill in the places provided in the mineral acquisition sectors to service the mining industry and this and technician training facilities available.

This state of affairs continued at Independence and thereafter because the new Government also had to earn the hard currency from the mines. Craftsmen Technicians and Technical teachers found ready employment in the Mines, Railways and the motor firms like UAC,

UTC, Staveley, and GNTC motors and also as teachers in the Technical Training centers. A group of them went on their own and set up places like Soame in Kumasi and Kokompe in Accra.

For the Technician Engineers and the professional engineers, the Public Works Department which at the time encompassed all the Utility Companies, the Water Division the Roads Section and the Electric Power Division and the Railways Department had places and training schemes designed to absorb them.

At Independence, the few expatriate professional engineers were in charge of the Public Works Department (PWD) as Regional and District Engineers. There were only two Ghanaian Engineers; Ing. E.Y.S Engman and Ing. Annan as District Engineers. The other local engineers were the city engineers in Accra, Sekondi-Takoradi and Kumasi.

At Independence the PWD had responsibility for development, operation and maintenance of Government Projects and Architectural and Civil Engineering services, covering roads and bridges, architecture and building water supply and support services like geodetic engineering quantity surveying, mechanical engineering services and hydrological services.

Professional engineers serving in the Department were predominantly expatriates with only a few Ghanaians who had returned from overseas. Experienced Ghanaian Technician Engineers and Engineering Technicians too were limited.

One such Professional Engineer, Ing. E.Y.S Engmann started off as Executive Engineer, then District Engineer and finally Regional Engineer when he returned from overseas, later was appointed as a Senior Training Officer in 1957-1958 to organize training and experience for Ghanaians to accelerate the takeover from the expatriate staff as envisaged by the Africanization programme put in place by Osagyefo Dr. Kwame Nkrumah the first President of Ghana. It is on record that in pursuance of his Africanization policy, Osagyefo asked Ing. E.Y.S Engmann to represent Ghana at a conference for West Africa Engineers in Nigeria just after Independence when all the attendees were expatriates.

The PWD had a comprehensive training scheme for various categories for professional staff-engineers, architects, quantity surveyors and their sub-professionals.

For new graduates there was a programme of experience with various departments — roads and bridges, architecture and building, hydrology, water supply sewage and sewerage disposal etc. to enable them choose specialization options. Fellowships offered to the fledging democracy to take the young engineers to the United Kingdom, Canada, Australia, India, Germany, Italy and France were also used for specialization.

The PWD established a Road Training School at Takoradi and Technical Supervisory Training school at Weija, Accra to train the sub professional grade personnel, the Technician Grade personnel and also draughtsmen. The above training Programme began by Ing. E.Y.S Engmann was able to accelerate the development of highly competent technical manpower for the country's large development programme as well as the operation and maintenance of the expanding infrastructure in those days.

4.0 EMPLOYMENT AFTER TRAINING OVER THE LAST 50 YEARS

Mr. Chairman, I have included elsewhere in this paper a list of establishments offering employment. The list is by no means exhaustive. These establishments have been categorized

broadly into:

- Technical Ministries
- Research Institutions
- Utility Companies
- Authorities/Corporations
- Consulting Engineering Firms
- Construction Companies
- The World Bank
- Manufacturing/Production/Marketing Firms
- Metropolitan/District Assemblies
- Oil Marketers
- Mining Companies
- Security Agencies

4.1 Technical Ministries

The Technical Ministries are made up of:

- Ministry of Water Resources Works and Housing
- Ministry of Transportation
- Ministry of Energy
- Ministry of Telecommunications

At Independence and at the establishment of the ministries, the highest ranking officer who advised the minister on ministerial matters in all the ministries were Public Administration and Humanities graduate. This obviously was not the best especially for the technical ministries when decisions and reports pertaining to technical matters were required.

In 1973, the then Government transferred the Engineer in Chief of the PWD, Ing. E.Y.S Engrmann to the Ministry of Works and Housing as Technical Director to address the need for technical personnel in the preparation of Technical Reports to the Castle and generally handle the technical issues from the departments under the ministry.

It was in this same period that the PWD begat the Architectural and Engineering Services Corporation (AESC), (1973) and the Ghana Highway Authority (GHA), (1974). The Ghana Water and Sewerage Corporation (GWSC) and Ghana Housing Corporation (GHC) had earlier on come out of PWD and operated as departments before being turned into Corporations.

During the PNDC Era, prior to the passing of the Civil Service Law, 1993 (PNDCL 521) the Government experimented with two acting Chief Directors, Technical and Administration. -In the Ministry of Roads and Highways, for example, Ing. Kwesi Abbey Sam was appointed as Acting Chief Director — Technical, while the incumbent kept the position of Acting Chief Director — Administration. After a period of two years, Ing. S.K. Nunoo continued in the Ag. Chief Director —

Technical position.

This experiment provided an opportunity for oversight and coordination to be proved for Agencies under the Ministry.

Technical details could easily be evaluated and technical input into speeches and reports were enhanced. The system for the classification of road contractors was initiated at this time.

With the implementation of the Civil Services Law, 1993 only one Chief Director was appointed for each Ministry. For the Ministry of Roads and Highways/Roads and Transport/Road Transport/Transportation, the Chief Director has been an Engineer since September, 1993. Additional Engineers have been appointed to Director and other positions in Monitoring and Evaluation, Planning and Information Management System to improve the effectiveness of the Ministry in Policy Formulation, Monitoring, Evaluation and Coordination of the Agencies under the Ministries.

As a test case to justify the establishment of these cadres in the ministries, I would like to expand for completeness the system that pertains in the Ministry of Road and Transport.

The Ministry of Roads and Transport has oversight responsibility over six implementing agencies under the Chief Director. The agency, the Ghana Highway Authority (GHA), is semi-autonomous and has a supervisory board. GHA is responsible for the development and maintenance of the trunk road infrastructure and employs nearly 200 professional

engineers and Technicians engineers. The Department of Feeder Roads (DFR) is civil service department which came out of Social Welfare Department of old and is in charge of the feeder road network. The Department of Urban Roads which came out of the City Engineers Department is responsible for roads in the urban areas and employs about 40 professionals and sub-professionals. The National Road Safety Commission's responsibility is to ensure safety on the road network through education of road users and collaboration with the providers of road infrastructure. The Driver and Vehicle Licensing Authority (DVLA) establishes standards and methods for training of drivers and inspection of vehicles and also employs a 'fair number of professional and sub professional engineers. DVLA is also responsible for the issuance of driving licenses and registration of vehicles. The Ghana Road Fund (GRF) is also under the MOT with the key responsibility of mobilizing internal resources to sustain road maintenance and has a Board for management.

Ministry of Roads and Transport (MORT) has retained engineers to man its various directorates. This internal management structure is based on an extension of the four — directorate civil service structure with Directors of Administration, Finance, Monitoring and Evaluation, Policy and Planning, Research, Statistics and Information Management, Human Resources Development, Procurement. The Ministry of Roads and Transport (MORT) and it agencies spend 1/3 of Ghana's budget in the planning, design, construction and supervision of a great length of road development be it feeder, trunk, urban road and also bridges.

4.2 The Utility Companies

These consist of Volta River Authority (VRA), Ghana Water Company Limited (GWCL), Electricity Company of Ghana (ECG), and Ghana Telecom (GT) and between them employ over 3000 engineering professionals from Artisans, Technical Assistants, Technician Engineers and Corporate Engineers. For the purpose of this presentation I will focus on GWCL.

The GWCL typically like the other utility companies at independence was part of PWD and operated in the names of Department of Rural Water Development (RWD) and the

Hydraulic Divisions of the PWD.

In 1958, the Department of Water Supplies Division (WSD) was formed under the Ministry of Works and Housing to take over the functions of the two units and be responsible for both urban and rural water supplies.

In 1959, the Government of Ghana realized that a department could not manage the water supply system efficiently and requested the WHO for experts to study the situation.

The experts in their reports of 1961 recommended an autonomous body to run the watersupply system. In September, 1966 an Act parliament (Act310 — the Ghana Water and Sewerage corporation Act 1965) established the Ghana Water and Sewerage Corporation (GWSC) with added responsibility for the development of facilities for the collection, treatment and disposal of sewage.

In 1969 GWSC operated 75 water supply systems with a total production of 43 million gallons a day comprising 3 cities, 34 urban and 38 rural centers made possible in large measure by considerable numbers of Artisans, Technicians and a few Technician Engineers and Corporate Engineers.

By 1995, the GWSC operated and maintained about 210 pipe-borne water supply systems, some 6500 boreholes fitted With pumps and 1 sewerage system in Accra. The Tema Metropolitan Assembly runs the sewerage system in Tema. Out of the 210 systems 124 serve urban centres whilst the remaining 86 serve rural communities. The increase in production was certainly accompanied with the proportional increase in the employment of more engineering professionals.

In 1994, the Community Water and Sanitation Division (CWSD) was created within GWSC to be solely responsible for the provision of potable water and sanitation for rural communities. CWSD became an autonomous body called Community Water and Sanitation Agency (CWSA) by Act 564 of December, 1998. Mainstream GWSC then was responsible for urban water supply only and the process of preparing it for private sector participation commenced.

No	ARTISANS	TECHNICIAN ENGINEERS	CORPORATE ENGINEERS
1	Artisan	Asst. Technician Engineer	Assistant Engineer
2	Junior Foreman	Technician Engineer	
3	Foreman	Snr. Technician Engineer	Senior Engineer
4	Superintendent	Prin. Technician Engineer	Principal Engineer
5	Senior Supt	Chief Technician Engineer	Assistant Chief Manager
6	Principal Supt.	Chief Manager	
7	Chief Supt.		

GWCL has always employed large numbers of the lower and middle level engineering professionals on account of the nature of work involved in the production and distribution of potable water.

Two number tables showing the Number of Engineering Professionals in GWCL and Career Progression of Engineering Professionals in GWCL are given here to illustrate the operations of the corporation, for the classes, starting from the lowest to the highest.

Table 4.2.1 Progression of Engineering Professional in GWCL

GWCL is mainly an Engineering firm that employs a large number of engineering professionals. These include Artisans, Technician Engineers and Corporate Engineers. The areas of engineering covered are Civil, Electrical and Mechanical and of late Geodetic Engineering.

Table 4.2.2 Number of Engineering Professionals in GWCL						
Year	2001	2002	2003	2004	2005	2006
Artisans	252	241	257	223	153	169
Technical Assistants	47	49	39	28	20	22
Foremen	249	250	239	267	159	152
Superintendents	317	311	402	411	307	301
Technician engineers	57	60	59	46	45	48
Corporate engineers	63	65	64	52	49	49

They work predominantly in:

- planning and development,
- water quality assurance and
- operations and maintenance.

There is a structured training programme adopted by GWCL. When an engineering professional is engaged in the company, she or he is given an induction as well as orientation course. The induction consists of introduction to all the departments and units. Orientation is by attaching the individual to the various departments for calculated periods in turn before being assigned to a permanent department or unit. On the job training continues in tandem with normal work schedule. Workers are allowed to attend seminars and conferences to acquire knowledge in their fields of practice.

There are also academic or practical attachment courses both locally and overseas arranged for some of the professionals. GWCL like the other utility companies suffers from maybe the same ills i.e. the following add up to account for the lot:

- Inadequate quantity and poor quality water from existing treatment plants due to poor operation and maintenance as a result of unqualified and insufficient staff, lack of spare parts, fuel, lubricant and chemical shortage.
- Unscrupulous or ignorant consumer public and staff involved in non-payment of water bills, diversion of revenue, illegal connections, improper billing, poor meter reading and distribution of bills
- Waste of water through unattended leaks in the distribution network in homes and offices, uncontrolled use of water.
- Poor consumer and staff management practices have been a bane on the operations of the company.
- Lack of funds due to low tariff levels and poor revenue collection.

Water supply is capital intensive and costs cover dams, other civil structures, mechanical and electrical plant and equipment, service reservoirs, pipes and accessories, chemical and energy

costs are also very high in operating the schemes.

Pollution of raw water sources resulting in higher chemical usage and costs, colour taste and odour problems.

Illiteracy rate in developing countries is so high, the majority of the people do not appreciate the essence of clear water.

Political interference in the operations of the water supply companies also does not enhance good corporate management.

GWCL believes that for the company to be more efficient and achieve its mandate of providing adequate potable water for residents in urban Ghana the right choice of managers must be put in charge. In order to ensure this, proper and adequate training must be arranged for the managers. Furthermore, a realistic and economic tariff must be gradually introduced to meet the financial commitment of the company. Good management practices based on good business practices can only be assured if there is no unreasonable political interference. People should appreciate that there is a large investment requirement to meet the demand for potable water.

4.3 Research Institutions

The key research Institutions whose activities cover engineering include the Building and Road Research Institute (BRRI) the Institute of Industrial Research(IIR) and the Food Research Institute (FRI) all of the Council for Scientific and Industrial Research Ghana . The BRRI was established in 1952 as the West African Building Research Institute in Accra. At the time most of the staff in the professional grade were expatriates, a condition which did not stay for long after Independence when the other West African countries in the partnership moved out to establish their own research institutes in the early sixties. It was re-designated Building Research Institute of Ghana and put under the Ghana Academy of Sciences when this exodus happened.

In 1963 when Kwame Nkrumah University of Science and Technology (KNUST) faced acute shortage of lecturers in Architecture and Engineering, the then Government of Ghana found it prudent to relocate the institute to the KNUST campus to help.

In 1964 the Institute's mandate was expanded to include road transport research and it was renamed the Building and Road Research Institute (BRRI).

Mr. Chairman, like other research institutes, career making at BRRI is open to the very top performing graduate engineers and allied professionals.

The mandate which justifies the use of the very top class students is generally to carry out research and development activities to address pressing national needs in the areas of road and building design, construction, operation and maintenance. Under a Government of Ghana Public sector reform programme BRRI is also expected to transfer technologies developed to industry, particularly the private sector and in so doing earn at least 30% of its budgetary needs from these sources. It is not intended that the institute should compete with private sector consulting firms in the provision of routine consultancy services.

The research programmes of the Institute encompass the following:

- s Development of alternate building materials from local sources
- Study and confirm strength and durability of imported building materials under Ghanaian climatic conditions.

- Development of Innovative designs to ensure cost effectiveness in shelter construction.
- Evaluation of local clay deposits for possible use in construction.
- Technological properties of lesser-used species of timber.
- Studies on termite and fungal attacks on timber structures and other building materials and their control.
- Energy efficiency in the build environment.
- Road safety research comprising accident black spot analysis safety of auditing of road transport scheme and tests of road safety devices.
- Basic data for road planning and design.
- Modern pavement design construction methods.
- Timber bridge design and research.
- Assessment of geological hazards — Landslides and other mass movements slope stability analysis etc.

Mr. Chairman, the Institute has among other results the following to show whether the mandate has been successful with the engineers in a wide range of disciplines — technologists, architects, planners and quantity surveying and land surveying, the other complimentary disciplines.

- Development of pozzolana cement from clays and bauxite waste. Pozzolana cement can replace up to 40% of Portland cement in sandcrete blocks for normal building purposes.
- Production of lime for material stabilization from limestone and clamshells.
- Setting up of small and medium size clay brick manufacturing capacities in selected district assembly areas.
- Database on resistance to termite attack on 80 species of timber.
- Construction of prototype timber laminated bridge across river Subin in Kumasi.
- Characterization of geological and geotechnical properties of Ghanaian soils.
- Preparation of Ghana Building Code.
- Setting of comprehensive database of road traffic accidents in Ghana.

The specialists who choose to make a career with the institute operate through 5 Technical Divisions namely Structures, Design and Planning, Traffic and Transportation Engineering, Geotechnical Engineering, Building Materials Division and Construction Division.

The current staff standing includes the following Engineering personnel by Division:						
Engineering Discipline		Number of Personnel by Technical Division				
		Structures	Traffic	Geotech	Materials	Construction
CIVIL	Engineers	5	4	2	1	3
	Technicians	1	3	2	1	2
GEOLOGICAL	Engineers	-	-	7		-
	Technicians	-	-			-
CHEMICAL	Engineers	-			2	-
	Technicians	-				-
MATERIALS	Engineers	-	-		-	-
	Technicians	-	-		1	-

The Institution thus has 15 Civil engineers, 7 Geological and 2 Chemical engineers. There are also 9 Engineering Technicians.

The career progression for a young graduate in the BRRRI goes through the ladder from a first position as Assistant Research Scientist and progresses through Research Scientist, Senior Research Scientist, Principal Research Scientist and finally Chief Research Scientist. Over the period, the engineer would have received fellowship or scholarship to do post graduate studies and has the choice to attend seminars, conferences both locally and overseas.

The career progression for a young engineering technician has nearly the same routing with the prefixes but on a different level. She/He moves through Technical Officer Senior, Principal and finally to become Chief Technical officer.

The Directorship is up for grabs when it becomes vacant by responding to advertisement and interview, with all other Ghanaians in the institute or other establishment of same stature and who are above the rank of Principal Research Scientist. Normally the government makes this appointment.

Mr. Chairman, perhaps the biggest challenge that the BERT currently faces is that of funding to carry out its research and development activities. Funding which is supposed to come from the consolidated fund is rarely made available and when available may be too little for any serious work. I learn that it is in recognition of this funding difficulty that the institute reaches out for any job that will earn some Internally Generated Funds. By so doing, the institute is not only competing with the private sector for routine consultancy services but has also abandoned part of its core research mandate.

4.4 Consulting Engineering Practice

At Independence there was no local consultancy practice in the country. All jobs requiring the services of consulting engineers were contracted to companies outside the country. The oldest consulting engineering company is de Weger, Gruther, Brown and Partners who stayed after the parent company completed projects in Ghana.

In 1968 the first wholly indigenous consulting engineering company initially known as

Attobra & Frimpong got established as Associated Consultants. The company had operated as a structural engineering and land surveying company before 1968 but took on board architects Kpodo Tay, S.G.T Kofi, Ing Dr. A.M Ansah and Mr. Tamakloe who was a planner. In 1969 Asafo Boakye and Partners was also established. BAB consultancy came in directly after and the 3 were the most notable. Smaller firms of consulting engineers got established thereafter. Most of these companies operated as structural engineers in the formative years and other disciplines were added as time went on.

These established firms started in earnest employing the young and potentially bright engineers from the KNUST. Over the years, i.e. between 1980 and 2000 a lot of young engineering graduates and technician engineers leaving the universities and polytechnics respectively have been attracted to start careers with consulting engineering firms. This attraction has resulted in the establishment of a large number of consulting firms. The older firms have however, remained in the forefront and managed to keep a large professional working force in their offices.

The partnership arrangement that used to be the order of the day has given way to corporate structures of limited liability status with the firms carrying professional indemnity.

4.5 Construction Firms

Ghana like any other developing country executes many construction projects in its developmental agenda. There has been therefore for a long time a very vibrant construction industry in progress.

There are all sizes of contracting outfits as indicated on the list of agencies for offering careers to the young professionals. There are the Taysecs, the Sonitras at the very top ladder employing a large contingent of craftsmen, technicians and technician engineers with the craftsmen forming nearly two thirds of the lot. There are a few graduate engineers who are kept as specialists and managers. There are also a few up and coming firms like Lemet, Crane, etc. They also employ their fair share of craftsmen, technicians, technician engineers and engineers and take on projects according as their classification will allow.

With the massive lending from World Bank and other International Finance Institutions into the Infrastructure development in Ghana, one would have expected a buoyant construction industry in Ghana with Ghanaian engineering companies assuming the commanding heights. Unfortunately, this has not been the case. The construction industry is in huge disarray and bedeviled with many problems but for Ghana to achieve the Millennium Development Goals, it behooves the Ghanaian professional engineers to take up the challenge and demand

the government to create an enabling but competitive environment to enable the indigenous contractors to access and be awarded by merit the majority of the large infrastructural development contracts and to deliver quality infrastructure which in turn will promote growth and sustainable development for our country.

4.6 Academic Staff of the Universities And Polytechnics

The Universities, the Polytechnics and the Advance Technical colleges have retained a fairly large proportion of the graduate engineers and Technician Engineers as lectures. The professionals are selected from the persons who distinguished themselves at the undergraduate levels and others who already have pursued post-graduate training abroad.

At Independence some of these lecturers came out of the stock of engineers who were trained in the Achimota School of engineering and the rest were expatriates.

In time and with the continuous development in the infrastructure at KNUST and the increase in the number of graduands there has been a phenomenal increase in the number of lecturers who are Ghanaians. Indeed some of the products have gone on from the work in the lecture halls into the administration of the Universities and have become the vice chancellors thereof. Two Ghanaians who have gone through this and have become Vice Chancellors of KNUST are Prof. Ayim previously of the Faculty of Pharmacy and Ing. (Prof.) Kwesi Andam previously of the College of Engineering.

It is worthy of note to confirm here that the college of Engineering at KNUST, have on its academic roll. Engineers from the Assistant lecturer position to the professorial position.

Mr. Chairman the same can be said of the Polytechnics. There exists a large corps of engineers some originally trained in KNUST holding the most senior appointments in all the ten Polytechnics in the country. The professional engineers in the teaching profession have been supported in the technical aspects of the programmes by also a sizable number of technician engineers.

5.0 ROLE OF THE GHANA INSTITUTION OF ENGINEERS

At independence there was nothing like the Ghana Institution of Engineers. A few years after independence however, smarting under the Africanization policies of Osagyefo Dr. Kwame Nkrumah, the few indigenous engineers who hitherto had been content to belong to the professional engineering institutions overseas where they had been trained caught the Pan African fever and decided to set-up and maintain an institution of their own.

Indeed the expatriate engineers in this country at the time and who belonged to the same institutions as the Ghanaians somehow decided not to recognize the Ghanaian members.

The Ghana Institution of Engineers (GhIE) was founded in 1968 following from the meeting of over 100 engineers in 1966 to deliberate on the formation of a local institution separate from the group of engineers who out of conservative elitism wanted to perpetuate only the overseas institutions. From its beginnings it was evident that the formation was to seek and maintain their own interest contrary to the vision and mission of existing institutions overseas.

The fledgling GhIE operated under the Professional Bodies Decree NRCD143 of 1973. It was setup as a professional body to establish and manage a register of engineers to practice in Ghana and regulate the practice of engineering in Ghana.

Its formation was very appropriate with the time because a lot more engineers had been produced, 30 to 40 yearly and placed in positions of trust, and it was necessary to register

them and regulate their practice, bearing in mind the public interest.

Before the NRCD 143 of 1973, the GhIE also derived power and authority from NLC 404 in which the council of the GhIE was the governing body of the institution. NLC 404 inter-alia confirms the following:

It shall be the duty of the council:

- To conduct or provide for the conduct of qualifying examinations for the membership of the institution and to prescribe or approve courses of study for such

exams.

- To maintain and publish a register of engineers, that is persons who have obtained degrees or other qualifications in any branch of engineering in any university or other institution or establishment recognized by the council as of the required standard or are members of societies or institutions of engineers approved by the council as being in the opinion of council societies or institutions of equivalent status to the Ghana Institution of Engineers.
- Make recommendations to the government for the striking off from the register the name of any engineers for stated misconduct or incompetence.
- To secure the maintenance of professional standards among persons who were members of the institution and to take such steps as may be necessary to acquaint such persons with the methods and practices necessary to maintain such standards.
- To maintain a library of books and periodicals relating to engineering and encourage the publications of such books.
- To encourage research in the different branches of engineering and generally to secure the well being and advancement of the profession of engineering.

Unfortunately, this edit was not given final ascent by the then government.

However, Mr. Chairman, the GhIE has been able to maintain a register of engineers to practice in Ghana. We have about two thousand (2000) on roll.

- The GhIE has been involved in examining curricula for engineering courses that are being run in Ghana.
- The GhIE now works closely with the National Accreditation Board. The GhIE has been able to mediate in disputes that have arisen during the course of engineering practice.
- The GhIE has over the last twenty years mounted several continuing Professional Development programmes. Indeed, it's programmes committee maintains a very busy calendar all the year for seminars, workshops, etc...
- The GhIE has been able to maintain a library of books and periodicals related to engineering.
- The GhIE has nominated and kept very experienced engineers to serve on public , boards, committees and interviewing panels requiring engineering inputs.
- The GhIE has assisted and continues to assist sector ministries financial institutions, oil companies, corporations with human resources in the organization of training seminars and workshop for their staff.
- The GhIE was involved in the accreditation of the Higher National Diploma engineering courses in the polytechnics to ensure that programmes met acceptable standards.
- The GhIE was involved in the assessment of the civil engineering degree courses at KNUST undertaken by the Joint Board of Moderators of the Institutions of Civil, Structural and Building Services Engineers (UK) and accredited by the Engineering council (UK). As a result of the accreditation the course at KNUST enjoys recognition by a number of

engineering institutions world wide.

As a follow up to this, accreditation has been given to the various degree courses pursued at the now College of Engineering.

The GhIE has yearly held Technical Conferences at which engineering professionals from the private and public sector organization locally and from invited engineering professionals from outside the country have presented papers for discussions.

The GhIE has continued to produce technical journals and newsletter and the magazine for its members and others to acquaint themselves of the programmes and activities of the institution.

The GhIE has intensified on its membership drive and has opened a register for students pursuing engineering programmes in the universities and the polytechnics. It has carried this drive into mining communities to unearth the considerable engineering personnel for registration.

The policy of actively encouraging females to pursue engineering programmes in the third cycle institution is very well addressed now by a network of Ghanaian female engineers and student members within the GhIE called Women in Engineering which was formed in 1999 with the apt acronym WINE.

The GhIE has signed a memorandum of understanding with the Nigerian Society of Engineers (NSE), the Sierra Leone Institution of Engineers (SLIE), and the Engineering Institution in Burkina Faso and has since participated in the annual conferences of NSE and SLIE. Both of them and the Togo Institution of Engineers attended the GhIE's conference last year.

The GhIE after the MOU has been able to cooperate with the NSE on the introduction to that institution and thereby the country on the formation of Road Fund Board and is assisting in the preparation towards the enactment of a Procurement Agency/Board.

Mr. Chairman, the GhIE has proposed an Engineering Bill to put in place an Engineering - Council with the specific legal backing to fully regulate the practice of engineering in this country. The GhIE is aware that further work on it is being addressed by the Sector Minister, the Minister of Water Resources, Works and Housing. It is ironical that out of the institutions mentioned above in the memorandum of understanding only the GhIE does not possess a fully legitimate Engineering Council.

The GhIE has launched a website to inform our members and general public about the programmes of the Institution.

The GhIE is proposing a new direction for the Institution which is outlined in a five year strategic plan presently under discussion and it is hoped that it will be presented to the AGM in March 2007. The plan has the following Vision and Mission:

VISION - Promoting Engineering Excellence for Society.

MISSION - Be leaders in the development of Science, Engineering and Technology at all levels of society. Share knowledge and instill in the membership professionalism and ethical practice. Establish structures to ensure good corporate image of the institution at all times.

6.0 THE WORLD BANK'S INVOLVEMENT

The International Development Association (IDA) one of the institutions under the World

Bank has provided the bulk of World Bank Assistance to Ghana through the provision of credits.

Mr. Chairman, Past Presidents, distinguished ladies and gentlemen, the World Bank gave its first loan of US \$70 million to Ghana in 1962 five years after Independence for the construction of Akosombo Hydro-electric Plant. The total amount of the project was US \$140 million.

Since then it has helped finance more than 120 projects and programmes with more than US \$5 billion. The overwhelming majority of the lending has been for specific engineering projects such as electricity, roads and railways, mining, environment, and water.

In the area of debt relief, the Bank recently forgave Ghana a large portion of its debts amounting to more US \$2 billion.

The office of World Bank was established in 1971 as a Liaison Office upgrading later in 2000 to a Country Office. It is staffed with both Ghanaian and expatriate staff. Staff of the country office have primary responsibilities of monitoring and supervising World Bank financed projects in Ghana and promoting the on-going dialogue between Ghana and the Bank. The strength of the professional staff including engineers who are corporate members of the GhIE is an indication of the importance the World Bank attaches to its work in Ghana. The engineers in the Country Office in Ghana include Transport Specialists, Municipal Engineers, Infrastructure Specialists and Procurement Specialists.

7.0 THE IMPACT OF GHANAIAN ENGINEERS ON THE SOCIETY

Over the last 50 years, Ghanaian Civil Engineers have been responsible in the provision of the network of roads, bridges, dams, irrigation canals, potable water, factory buildings and office blocks which are the very basics any community needs to sustain itself to develop and prosper.

Specifically they have been responsible for the running of GHA, DUR, DFR, GWCL, CWSA, IDA and HYDRO DIVISION. Notwithstanding the difficulties and the conditions under which

they have had to work, one cannot fathom the state of these facilities without them.

The numerous factories that have appeared on the Ghanaian scene since Independence have been sustained by our hardworking Chemical and Mechanical Engineers. Think of companies like Valco, Cocoa Products, Aluworks, Lever Brothers, the Breweries, Pioneer Foods, Tema Food Complex and Nestles in the smelting of alumina into aluminium, processing of our cocoa beans into cocoa butter and cocoa powder, production of aluminium roofing sheets, cooking utensils, food and soap products and other household needs.

The Electrical and Electronic Engineers have been responsible for power generation and Distribution. In spite of the load shedding which currently is on going and which some of us find unfortunate is being managed efficiently even with the obsolete and sometimes nearly unserviceable equipment.

Mr. Chairman, the management of such occurrences in some countries that I am familiar with make us notice how hardworking and dedicated our engineers have been over the last 50 years.

The Telecom, Internet explosion have largely been sustained by our Ghanaian Engineers, Technologists and Technicians. Volta River Authority has been touted as one of the best run Companies in Africa and we are all aware that VRA has been run for almost all its life by Ghanaian Engineers, Technologists, Technician Engineers and Technicians. Other

companies ' like ECG, Ghana Telecom, Areeba, Tigo, Kasapa and the rest have been to all intents and purposes wholly run by Ghanaian engineering professionals.

Developments in the Muffing sector has been on the ascendancy, indeed phenomenal in the last 30 years and it is pertinent to recognize that the operations of the mines have been supported immensely by our Ghanaian engineering professionals. Companies like AngloGold Ashanti, Tarkwa Goldfields, Awaso Bauxite and Manganese come readily to mind. Ghanaian engineers have risen to the very top positions in some of these mining companies.

The Metropolitan, Municipal and District Assemblies are short of municipal engineers who would have applied engineering skills in the planning, design, construction and maintenance of water, sewerage, roads and stormwater infrastructure of the residential, Commercial and industrial environments as well as the management of cleansing services, refuse disposal sites and building control.

As stated earlier it will be necessary to train more of these professionals as a complement of the decentralization process of the nation.

Mr. Chairman, Past Presidents, distinguished ladies and gentlemen, however minimal the impact of our Agricultural Engineers has been, a number of them are actively involved in the production of agricultural implements and in the increased production of agricultural produce and helping to minimize harvests losses.

In all the above, it is pertinent to remember the part played by Ghanaian Consulting Engineers in the delivery of the engineering services.

8.0 THE WAY FORWARD

The following factors needed to be seriously considered to enable a positive impact on Ghana's development by engineering practice in the country: i) Human resource development

- ii) Streamlining and strengthening regulatory and execution functions
- iii) Support to construction and consulting firms
- iv) Focus and support to research institutions
- v) Role of Ghana Institution of Engineers

Mr. Chairman, during my survey it became evident that 70 per cent or more of the work in engineering practice is done by the craftsman and the technician. This obviously informs us that the training of the craftsman and technician must be uppermost in our planning and implementation of technical education. It must be recognized that technical education is expensive but the benefits are substantial and they always outstrip the investment. I must say that if we are able to make any impact in the readiness to execute the huge integrated aluminum industry which happens to be a project dear to the present government, then we must always remember that. Funds must be made available to enable the technical colleges and polytechnics to improve and expand facilities for technical education and training.

The expenditure of workshop and buildings apart, large quantities of expendable materials are required for effective training. Staff of the right caliber and competence to undertake teaching at the polytechnic level is not available because, Technologists and Graduate Engineers and Diplomates with considerable industrial experience get poached by industry on account of higher salaries and other fringe benefits offered. It is therefore incumbent upon the

government to offer competitive salaries and fringe benefits to retain this caliber of staff in the polytechnics and technical institutions.

It should be possible to allow the technical students to work in industry to enable them strengthen their knowledge and practical skills. Employers are always reluctant to take on the students for this practical attachment because the scheme stands in the way of achieving their production targets. I believe if some incentives is offered to employers it will offset any imaginary or real losses and the country stands to gain when at the end of training, the student is properly trained to be of service. The firms are also reluctant to pay allowance to the trainees on attachment. In this area of difficulty I believe the allowance should be built in the course fees which a loan system open to students will take care of.

8.1 Training of Graduate Engineers

It is a well known fact that Graduate Engineers do not accept careers in the construction industry because the initial anticipation that after a few years they will be able to set up their own firms never see the light of day. The reason is very simple. Graduate engineers are not adequately prepared as part of their training to become entrepreneurs.

Courses taken at the undergraduate level must be expanded to include basic courses in management, accounting, the environment and some amount of legal education to place them in readiness to become entrepreneurs. Students must go back to the era when it was a requirement to go acquire practical experience on Industrial attachment for 3months of every year of the course duration. Financial outlay to make this possible should be incorporated the students loan scheme as previously mentioned.

Postgraduate training for students with such ambition (i.e. those hoping to set up construction firms and management practices) is most essential for successful implementation of construction 'projects in Ghana. The young entrepreneur armed with all the preparation must be encouraged by the government to go into construction with soft loans, to purchase the full complement of equipment.

The Award of contract must be on easy terms, and most importantly, the payment certificates for work done should be honoured in the shortest possible time to forestall delays in the project implementation and therefore financial losses and frustration.

Post graduate programmes offering specialization should be made available and graduate students should be encouraged to take up the offers to acquire specialization and return to augment or replace the retiring teaching staff in the tertiary institutions.

Mr. Chairman, it has been said that engineering practice could generally be divided into two broad categories i.e. regulatory and execution, where the Public Sector Organizations are in the regulatory domain and comprise Authorities / Corporations, some Departments and Agencies. The execution category is made up of consulting engineering firms and construction companies and procurement contractors. Of late the regulatory group seems to be performing both the regulatory and execution functions to the detriment of the business of the consultants and contractors. At the end of the day, we are the beneficiaries of 'half-baked' completed projects. I believe it will be in our mutual interest if the public sector organizations concentrated on the regulatory functions of the practice where they have the expertise, and leave the private sector organizations to compete in the execution (i.e. design, construction, operations and maintenance) where their expertise can also be called into play to deliver the best of results.

8.2 Technical Ministries

Mr. Chairman, I am of the opinion that work of the Department of Feeder Roads will be better enhanced when put directly under the District Assemblies since most feeder roads are located in the districts anyway. The oversight ministry may keep a control office to coordinate the activities of the offices in the District.

Many have also called for a division of Municipal Engineering in the Metropolitan Assemblies to be manned by Professional Municipal Engineers who may be produced from a Post Graduate course in KNUST. This is necessary because the scope of work for managing the large cities is always found to be beyond the capability of the graduate civil engineer in the staff of the Metropolitan Assemblies. I wish to say I share the same view and I recommend to Government for its implementation.

8.3 Consulting Engineering Firms

The Ghana Consulting Engineers Association which hitherto has been dormant and only manages to meet in half strength when an issue comes up must endeavour to rekindle itself and take its rightful place and promote the consulting engineering practice. Consulting engineering firms should mobilize and go into joint ventures with their counterparts and vie for projects with foreign consultants.

Consulting engineers must be bold and ask for practical levels of remuneration for services in order to be able to pay satisfactory salaries to their employees to guarantee their retention and forestall the brain drain which is slowly decimating the ranks of young engineers.

Consulting engineers must go into partnership with government to evaluate proposals from International financial organizations to be able to reject unfavourable proposals. Consulting engineers must aggressively go into partnership with other engineers beyond our borders and bid for projects in the sub region and in so doing set the stage to take the commanding heights of the economy in the sub region in particular and the whole of the African continent in general.

8.4 Construction Firms

Construction firms should abide by the dictates of NRCD 143 and be registered by Ghana Institution of Engineers (GhIE.).

Construction firms seeking classification should provide true and honest information for placement in the category where they will be found capable and grow into higher classes with on time delivery of projects. Construction firms should take advantage of the domestic content provisions for works. Construction firms should be able to sponsor their engineers on post graduate courses to acquire the requisite experience to use new techniques available in procurement of works. Construction firms should also encourage the engineers they employ to register with the Ghana Institution of Engineers at the class they qualify to belong.

8.5 Research Institutions

Government funding for research should be available and accessible on time to research organizations in the engineering environment. Research should just not be carried out only to satisfy the interest of engineers as scientists. It is essential that research in the engineering focus on developing new or improved engineering techniques. Researchers should be able to feed industrial establishments, consulting engineers, construction firms and the public sector organizations with the results of their research to enable them take good advantages of new techniques.

Extra funding should also be sourced from industry and organizations which make use of research findings. It should be possible Mr. Chairman, for a large industrial firm to sponsor research, financially or in kind when seeking technical solutions to their problems. Banking institutions should also be encouraged to fund research and in turn be able to sell to industry the findings of the research. Research Institutions should stay within the confines of their mandate to ensure that all their time is concentrated on research.

8.6 Role of the Ghana Institution of Engineers

The GhIE will spearhead the promotion of the four factors enumerated above.

The GhIE will approve the strategic plan in the offing and live by the dictates of same.

The GhIE will continue to pursue the engineering bill until promulgated into law to and regulate properly the engineering practice in the country and while waiting for the passage of the Bill will test the authority it derives from the NRCD 143 with respect to the registration of engineers in practice especially foreign professionals who come under the guise of expatriates and continue in the practice of engineering.

The GhIE will continue in its discussion with Management Institutions to allow senior members to undergo courses in management. This will encourage the graduates thereof to set up businesses in other spheres of human endeavour.

The GhIE will expand the scope and resource personnel for its annual conferences to embrace the Engineering professionals in the West Africa sub-region. The Website will be improved and attain a level where the facility shall be a lot more useful than it has been to date.

The good policy of actively encouraging females to pursue engineering programmes at the universities will be continued so that there will grow a good gender balance and the nation will be the eventual benefactor.

The GhIE will endeavour to have slots on a radio and TV stations to have special discussion on engineering issues from time to time. We will also build fences with the print media to promote our image and to make a positive impact on the socio-economic development of our dear nation.

Finally but not the least to ensure the energy security of our country, we the members of Ghana Institution of Engineers hold ourselves in readiness to fully participate in all endeavours towards ensuring the energy security of our country with all alternative sources of energy delivery.

Mr Chairman, Past Presidents, distinguished ladies and gentlemen, I would like to recommend to the Ghana Institution of Engineers to recognize the contributions made by selected deserving engineers in the fields of Academia, Public Service, Consulting Practice, Construction and Research. I believe we have to celebrate our heroes.

Recognition shall also be given to students who have exhibited the highest of potential towards Engineering Practice.

I recommend that the criteria for selection for the award be determined by the Council of the Ghana Institution of Engineers.

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