Improving S&T Development and Policy Making in Ghana and Other Africa Countries: Lessons from United Kingdom

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Abstract

The importance of science and technology (S&T) in national development can not be underscored, as many, especially the developed countries have achieved the height development through aggressive development and application of S&T to their economies. Consequently both developing and developed countries have put in place mechanisms to exploit the potential of S&T. However the differences between the two are the level resources commitment to S&T as well as mechanisms established in these countries to paddle S&T development. Equally important is how these mechanisms and the general S&T environment are facilitated by the government through an effective S&T policy making.

The United Kingdom (UK) has established strategic institutions that are designed to improve S&T policy in general and communication between scientists and policy decision makers in particular, as well as building capacity of the politicians (members of parliament) in scientific issues. The paper reviews the S&T institutional framework in the UK and general support for S&T development. The author argues that Ghana and other African countries should design similar institutions such as chief scientific advisor at the highest level of government, establishment of special body to support parliament in S&T issues (but probably with different priorities) in order to effectively mobilize S&T for development.

1.0 Introduction

Generally, science and technology (S&T) are critical drivers of economic development. Advances in science and technology have contributed significantly to improvements in the quality of life in both developed and developing countries (Juma and Yee-Cheong, 2005). The ability of a country to access, comprehend, select, adapt, and use scientific and technological knowledge is correlated with the well-being and quality of life of its people. Developed countries have recognised this and supported the development and application of S&T to their economies accordingly. The commitment is illustrated by the level of funding and the various structures that have been established to provide policy directions for the S&T. For example, in 2003, the USA spent 2.6% of its GDP on research and development, the UK 1.9%, Germany 2.6%, and France 1.2% (OECD, 2005).

There has been increased political interest and participation in the development of S&T in the UK. This is epitomized by the array of policy making institutions and processes established to support S&T development. Special offices or structures have been established at the highest level of government to provide advisory services and coordinate S&T and innovation activities in the country. Such offices are the Parliamentary Office for Science and Technology (POST), Office of Science and Technology (OST) and other advisory committees and bodies. They were set up mainly to assist the political authorities in S&T policy making and advice. These are also buttressed by political statements, reviews and commission with the ultimate aim of positioning S&T on a higher pedestal in their development activities. Examples of UK's strategic programmes include:

⇒ Science and Innovation Investment Framework 2004 – 2014, launched in 2004. The over-arching objective of this Framework is to make UK's centres of excellence top world class research centres and this is to be achieved through the following:

Maintaining the second position after the US on research excellence, and current lead against the rest of the OECD; closing the gap with the leading two nations where current UK performance is third or lower; and maintain UK lead in productivity

i. Retain and build sufficient world class centres of research excellence, departments, as well as broadly based leading universities, to support growth in its share of international mobile R&D investment and highly skilled people. This is to be achieved through increasing 1.9 to 2.5 per cent of GDP invested in R&D (HM Treasury et. al, 2004).

⇒ The UK Foresight Programme launched in 2002. The aim of the Foresight programme is to increase UK's utilisation of science through identification of unique niches for the economy or society from new science and technolo-

gies, and actions to help realise those opportunities. The modus operandi to achieve this aim is by providing a core set of skills in science-based futures projects and unequalled access to leaders in government, business and science.

All Foresight projects among others are to deliver:

i. Thorough and up-to-date information and analysis of recent developments in relevant areas of science and technology, including an international perspective, and forecasts of what the next developments might be;

ii. Visions of the future, reflecting the potential impact of science and technology, and forecast social and economic trends, i.e. benchmarks for success and

iii. Recommendations for action, by research foundations, business, government or others, to make the most of the potential of science and technology[1].

These initiatives and others are to make the UK stronger in scientific field so as to achieve its objective of becoming second to USA in scientific ratings. A few indicators will buttress the underpinnings of these strategic frameworks and policies in UK. As at 2002, UK was fourth among the Organisation for Economic Co-operation and Development (OECD) countries in terms of patents applications to the European Patent Office (EPO). In all 5,265 applications were received from the UK (OECD, 2005). Further, in 2003, UK ranked fourth (9.9%) in the OECD export market share of high-tech manufacturing industries, as well as fourth (2,168 patents) in the triadic families patents (OECD, 2005)[2]. Again in terms of global subscriptions to journal by scientists, the UK's contribution is about 3.3% of the world's total, while its researchers contribute over 5% of all articles published world-wide[3].

1.1 S&T in Ghana

The S&T development and strategic plans as seen in the UK do not prominently feature in Ghana's development agenda. Beside, S&T Policy launched in 2000, not many high profile and strategic S&T programmes have been enunciated in Ghana. The national S&T policy has the objective of mastering S&T capabilities, developing infrastructure to support industry and other sectors of the economy to meet the needs of Ghanaians (MEST, 2000). Sadly, the strategic plan to implement the policy is yet to be adopted and implemented by the government. This is due to among others, the absence of political structure at the highest level of government to advice and champion the crusade for implementation of the strategic plan.

On the whole (albeit on limited scale) some national development plans, in the recent years have been thinly laced with statements of utilising S&T to propel development. For example, the Ghana Vision 2020 contained a statement on using S&T as a pedestal to enhance the socio-economic development of the country (Ghana Government, 1996). Further, the Ghana Poverty Reduction Strategy (GPRS) I (2003 – 2005) emphasized the need for robust development of S&T to bolster industrial production, employment, and natural resource production, food security, sustainability, self-sufficiency and environmental health (Ghana Government, 2003). However, in the case of GPRS II (2006 – 2009), no mention is succinctly made of S&T as tools to achieve the development targets in the document.

Generally, synergy between S&T and the political system had been weak in Ghana and the other African countries. NEPAD has alluded to this weak links on the continent, as it emphasized that political organizations have not accorded S&T top priority in their manifestoes and parliamentary activities (NEPAD, 2003). NEPAD also admits that technological change is a complex business that is influenced by many political factors. The dominance of vested national and international political interests that prefer to avoid technological change may have contributed to the weak position of S&T in most African countries. Yet, there is also the problem of weak institutions, inadequate financial and technical support and weak political commitment to the promotion of S&T that explain the poor performance of African countries in their efforts to mobilize S&T for development. For example, Ghana established the Council for Scientific and Industrial Research in 1968 with the mandate to conduct and coordinate all aspects of scientific research in the country[4]. Other countries such as Zambia, Kenya and Uganda have established science councils to spearhead scientific and technological research in their respective countries[5]. These institutions were established by Acts of Parliament of the respective countries, yet these Councils did not receive adequate resources and recognition to operate effectively. Thus, the initial enthusiasm has not been sustained throughout these years. Therefore, there is the need to regain this enthusiasm by initiating new programmes that will galvanise and build the capacity of the political authorities. The purpose is to enable them to appreciate and understand how S&T contributes to social and economic development.

The objective of this paper is to review the institutional framework for S&T policy making and for developing synergy between science and the political system in UK. The

study draws experiences from UK, which are practicable for Ghana and other African countries to emulate to enhance their S&T capabilities. It also looks R&D funding and contributions of S&T to national development. The paper does not address how S&T policies are made or the quality of the policies, but it examines some of the institutional frameworks within which the policies are carried out.

2.0 Science, Technology and Development in Context

S&T have critical roles to play in developing economic opportunities and growth. There are some indicators that point to the strategic linkage between S&T and economic growth and development. For instance, since the industrial revolution, countries with the most S&T capacity have experienced rapid growth. Thus, these countries have become increasingly wealthy, and their rates of growth have not diminished (Pritchett, 1995, cited in Crawford and Farley, 2003).

Clark and Juma (1992) argue that there are empirical evidence and theory to support the claim that long-term economic growth requires not only capital but also an understanding of innovation. For example, in Latin America, there have been increased levels of income and capital but growth rates have remained low. As a result, depending solely on accumulated capital may not be enough to ensure long-term growth rates that can reduce poverty (UN Task Force, 2005). There is the need to devote more attention to the catalytic role S&T can play in ensuring economic growth, as well as national development.

The UN Task Force Report (2005) also emphasized the need for countries to reduce dependence on the exploitation of natural resources and shift to technological innovation as the basis for development. The report cited the experience of Finland which has transformed its economy from one dependent on natural resources to a technology-based one, and thus becoming competitive in the global market. This was achieved through a combination of S&T, industrial and innovation policies. The experience of Malaysia is also instructive here. The country's economic success is basically achieved through aggressive development, utilisation and exploitation of S&T, and this culminated of its being ranked as fourth world competitive country in 2003 (Fan, 2004). This gives a strong indication, especially to the developing world about the potency of S&T to drive economic growth and development. Examples from other developing countries, bolster the importance of S&T to economic development. China's exports of high-tech products accounted for 28.6 percent of all of China's exports. The country is to increase its R&D expenditure to 2.5 percent of GDP so as to reduce reliance on foreign technologies as well as rank among the world's top five patent-holding countries[6].

Further, S&T are key ingredients to achieve the targets of the Millennium Development Goals. Improved farming methods achieved through advances in knowledge and technology can increase agricultural productivity, and production to improve food situations in many developing countries (UNECA, 2002). This, in combination with other factors can reduce poverty and hunger in the world (Millennium Development Goal 1). Further, improvements in fermentation technologies are providing wide range of food products, development of substitutes and also improvements in the quality of food which will improve the nutrition status of the people and improve their health.

In the same way, advances in science and technology can help address many of the health problems that confront the human race. Modern biotechnology and genetics are expanding the possibilities for producing new drugs and improving the efficacy of existing ones. Genomics in health research is also creating a wide range of new diagnostic tools that are changing how common diseases are diagnosed, managed, and treated, while advances in pharmacogenics are providing greater understanding of how the body responds to drugs, making it possible to provide more accurate and effective medication (UNECA, 2002).

The UN Human Development Report for 2001 stated that there has been growing political interest in the potentials of 'new technologies' such as biotechnology, genetics, biomedical technologies, energy technologies, remote sensing technologies and information and communication technologies to advance development (UNDP, 2002). The statement has positive connotation, however, but what is very important is how developing countries including Ghana, have not translated this interest into actual support for S&T. This is an area where most developing countries have woefully failed.

Given the low level of S&T development in Ghana and Africa as a whole, one would have thought that many of these countries will devote more resources to S&T development so as to bridge the technological divide between them and the developed countries. Sadly, the situation has not been so. Most African countries have failed to show serious commitment to incorporating S&T into their developmental strategies. Steinhauer, et.al (2003) analysed references made of S&T in the Country Strategic Papers (CSPs) of the African Caribbean Pacific Countries (ACP) to obtain support under the ACP-EU Pact[7]. According to Steinhauer, et. al, only 9% of the

Country Support Strategies (CSSs)[8] identified S&T as tools to enhance specific sector of their economy. Only five states referred to S&T in agriculture, and frontier technologies such as biotechnology, genetics and remote sensing technologies were not even mentioned. They were of the opinion that the term S&T was rarely used in the CSSs and this typifies the minor importance the countries attached to S&T as part of their development strategies. In this context, the UK House of Commons Select Committee on Science and Technology emphasized that developing countries ascribe low priority to S&T, and therefore, it is important for international development partners to clearly articulate the enabling role of S&T in programmes so as to achieve development target, such as MDGs (House of Commons, 2004).

Given the importance of S&T to economic growth and development, it is necessary that Ghana and other African countries become more serious about the development, application and utilisation of S&T resources for national development. A strong call is made for the establishment and commitment of adequate resources to institutions that can advice and strengthen the capacity of the political system to appreciate and make S&T the rubric of national development. There is a possibility that the existence of science advisors at the top hierarchy of government and at ministerial levels (as the case is in UK) would have ensured that ACP countries make S&T the core of their CSSs.

3.0 General Framework for Science and Technology Policy Making

Dialogue between the political system and scientists is one of the essential conditions to spur sustainable S&T development. The dialogue will provide avenues for knowledge sharing, appreciation of challenges that face each other, and more importantly engender the political system's interest in S&T. In this section, we shall review some of the institutions for S&T policy making in UK (a developed country) and Ghana (developing country) to see the institutional set-up for S&T policy making in these countries.

3.1 The Case of the UK

The presentation on UK draws heavily on the work of Cunningham (2002). Figure 1 presents the main government institutions involved in S&T policy making.

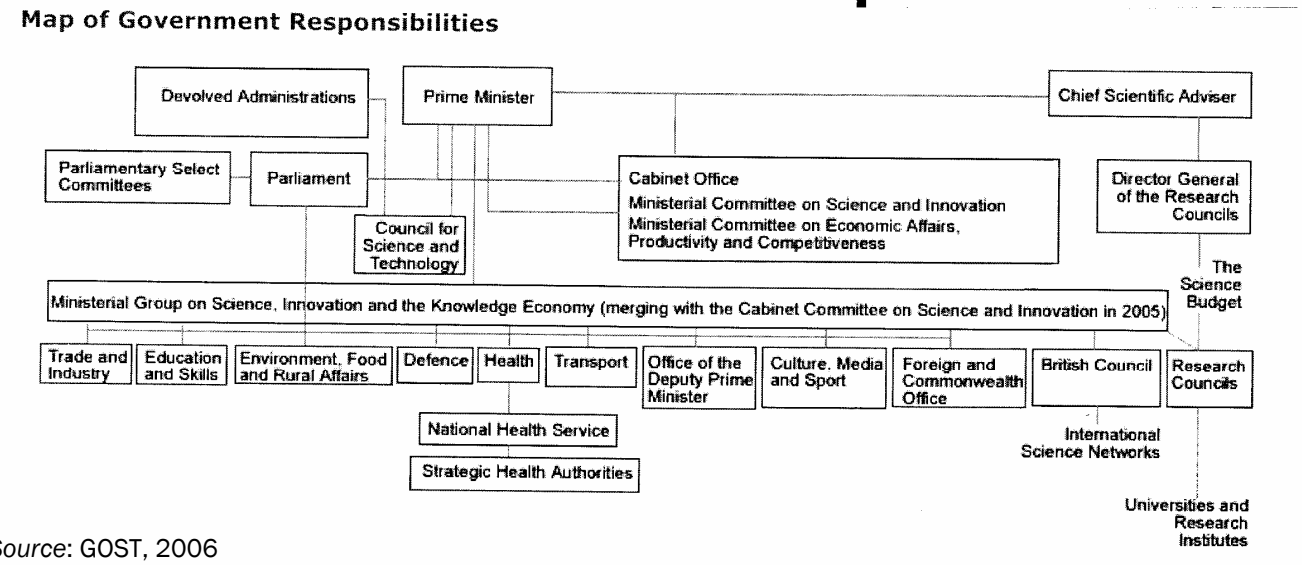
According to Cunningham (2002), the UK science policy making process is organised largely in a pluralist way with advice being received from a diverse network of committees and advisory groups. He further argued that there was an expectation of a drive towards centralisation of the policy making machinery with the creation of OST[9] which was to play a pivotal role in S&T policy making. However, this expectation is yet to be realised.

One of the important aspects of the S&T policy making process is the establishment or appointment of a Chief Scientific Advisor (CSA). The CSA provides policy advice on science, engineering and technology issues directly to the Prime Minister, the Cabinet, the Secretary of State for Trade and Industry, and the Minister for Science. The CSA is the head of OST. The CSA is also responsible for reviewing the entire research system and sits on virtually every important committee and advisory group - for example, the Council for Science and Technology and the Chief Scientific Advisor's Committee (CSAC).

The CSA, as stated by Cunningham (2002) also chairs the Committee of Departmental Chief Scientists, known as the cabinet official Committee on Science and Innovation. This committee has merged with the Ministerial Group on Science, Innovation and the Knowledge Economy. The Group discusses cross-departmental science issues, provides Cabinet ministers with much of their required information and plays an important role in policy implementation. The departmental chief scientist concept is an important one as it will ensure that departments are able to track and develop policies which are specific to their departments. It places scientific issues into the hands of officers who have competence to handle them. As a result, there is the likelihood for S&T issues to receive much attention and embedded in the activities of the departments.

Another set up of importance is the Council for Science and Technology (CST). It is one of the key scientific advisory groups in the S&T institutional framework. It was established in 1993 as the Prime Minister's top-level advisory body on medium- to long-term issues concerning the government's strategy for ensuring that S&T meet the country's needs (DTI, 2004). It also advises cabinet ministers on matters relating to science, engineering and technology and related policy issues.

In parliament, there is the Science and Technology Select Committee of the House of Commons as well as the House of Lords. Unlike the S&T Select Committee of the House of Lords, the Commons' committee is less influential in broader matters relating to S&T. It focuses more on the expenditure policy and administration of OST and associated bodies, and makes appropriate recommendations. The Lords' Science and Technology Committee, conducts on its own initiative, reviews on a broad range of scientific issues[10] and the Lords probably



Source: GOST, 2006

exercise greater influence through the Select Committee's reports than through its votes (Cunningham, 2002).

Finally, there are other institutions whose activities feed into the policy making machinery of UK. These are the Research Councils and the universities. The Research Councils consist of:

- Biotechnology & Biological Science Research Council (BBSRC);
- Council for the Central Laboratory of the Research Councils (CCLRC);
- Engineering & Physical Sciences Research Council (EPSRC);
- Economic & Social Research Council (ESRC);
- Medical Research Council (MRC);
- Natural Environment Research Council (NERC);
- Particle Physics & Astronomy Research Council (PPARC).

Arts and Humanities Research Council (AHRC)

One interesting thing about the S&T institutional framework of UK which needs emphasis is the presence of scientific advisors in all ministries to address S&T issues which are specific to the ministry concerned. Such advisors will enable the ministry to deal adequately with S&T matters peculiar to it and develop appropriate tailor-made policies and responses to advance the activities of the ministry. The critical question is how the government maintains synergy with all these bodies, committees and others.

3.2 The Case of Ghana

There is a sharp contrast between Ghana and the UK in terms of institutional framework for S&T policy making. In Ghana, there is no inter agency or an apex coordinating body that plays pivotal role in S&T making process. There is no cabinet advisory body on S&T or official chief scientific advisor to the President of Ghana. At best, the Minister of Education, Science and Sports could advise cabinet on S&T issues.

In Ghana, until May 2006, there was the Ministry of Environment and Science that had responsibility for cross-sectoral S&T policy making and the implementation of these policies required the collaboration with other ministries[11]. However, S&T policy specific to a particular sector, however, is engineered by the Ministry which has responsibility over that sector. In most cases, such ministries collaborate with others, including the universities and the research institutions in the formulation process and the implementation as well. In view of this, the mandate of Ministries with more S&T components are discussed in this section.

The Ministry of Trade, Industry, Private Sector Development and President Special Initiatives has overall responsibility for formulation, implementation and monitoring of Ghana's internal and external trade as well as the development of local industries. This is achieved through policy formulation, facilitating enterprise development including micro and small enterprises, development and enforcement of standards in trade and industry, and promoting Ghana's internal and export trade with emphasis on diversification and value-addition.

With the exception of cocoa-coffee and forestry sectors, the Ministry of Food and Agriculture (MOFA) is in charge

of the development and growth of agriculture in the country. Its primary roles are the formulation of appropriate agricultural policies, planning and co-ordination, monitoring and evaluation, and these are carried out within the overall national economic development plan.

Most of the agricultural research is carried out by scientific institutions which are not affiliated with MOFA. For example, the Council for Scientific and Industrial Research which is the country's foremost research council is now under the Ministry of Education, Science and Sports.

In relation to health, the Ministry of Health assesses and monitors the country's health status, advises the central government on health policies and legislation, formulates strategies and designs programmes to address health problems of the country. The Ministry also implements, monitors and evaluates (in collaboration with other related sectors and agencies) all health programmes and health research activities in the country.

Before the assignment of the science portfolio, the Ministry of Education and Sports was in charge of education and sports development. The responsibilities cover areas such as: expanding access to education at all levels, providing and improving infrastructural facilities, raising the quality of teaching and learning more from effective outcomes, making education more relevant to national goals and aspirations by focusing on vocational and technical education, and making tertiary education more cost effective.

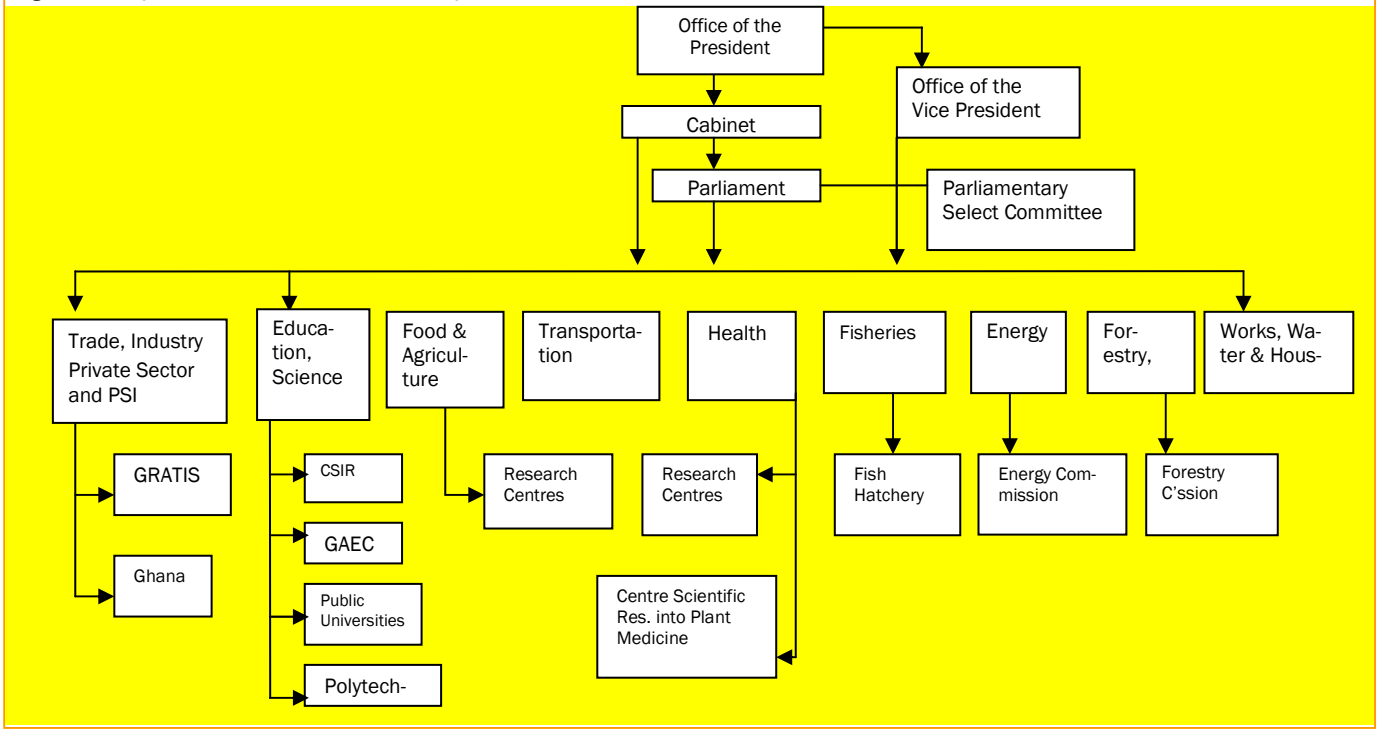
As energy issues are within the ambit of the Ministry of Energy, the Ministry is to extend and ensure reliable supply of high quality energy services to all sectors of the economy to facilitate productivity and reduce poverty. This is achieved through: improving existing energy supply systems, increasing access of modern energy services, productive and efficient use of energy, securing future energy supplies and minimising environmental impacts of energy supplies and consumption through increased renewable energy/energy efficiency economies.

Similar to agricultural research, energy research is mostly undertaken by institutions which are not affiliated to the Ministry of Energy. However, there is the Energy Foundation which among others, provides direction and financial support for energy research in the country. The Energy Foundation Ghana is a non-profit, public-private partnership institution, devoted to promoting energy efficiency and utilisation of renewable energy to meet Ghana's growing energy needs.

Besides the ministries, there is the Select Committee on Science and Environment of the Parliament of Ghana. The Committee's task is to review scientific matters referred to it by parliament for advice. It is also responsible for bringing to attention S&T issues that parliament and cabinet need to address.

Abysmally, there is no strategic body or inter ministerial committee to serve as a pivot to drive S&T issues in

Figure 2: Map of Government of Ghana Responsibilities



these ministries, or a definite outfit to advise the president and cabinet on S&T. The question is, besides the Minister for Education, Science and Sports, who does the president consult for independent opinion on scientific issues? That is where the need for a CSA to the government is important. The CSA just as in UK should be not be political appointment but as a Civil Servant appointed by the Public Services Commission of Ghana with service conditions comparable with high level officers working in the Service. This will give the CSA the independence to play that crucial role.

4.0 Outlook of S&T Funding

In the United Kingdom (UK), under the government's strategy for SET launched in 2002, the government plans to invest an additional £400 million[12] per year by 2005-06 in science and engineering research programmes, and an extra £100 million annually on equipment and capital infrastructure[13]. This shows the level of commitment of the UK government to improving her SET capabilities and infrastructure. Currently, UK research funding as a percentage of gross domestic product (GDP) is 2.0 percent and it is required by European Union to reach 3.0 percent[14].

The situation is different in Ghana and other African countries where not many financial resources have been committed or earmarked for the development of S&T. Most countries are unable to commit the minimum of 1.0 percent of their GDP to S&T development. This target was set in 1970s, as part of the Lagos Plan of Action for Accelerated Development in Africa (NEPAD, 2003). The average S&T funding Ghana has achieved is 0.3 percent of GDP, Nigeria is about 0.5 percent and 0.3 percent for Kenya.

The effectiveness of investment in R&D in UK can be assessed by a number of indicators, for example, the number of patents and level of R&D intensive-businesses among many others. In comparing the level of R&D intensive businesses in UK in 2002 with those of France, Germany and USA, the UK's share of high technology intensive businesses was 26.7 percent[15] (Department of Trade and Industry, 2006). This performance is viewed against the goal of narrowing the performance between leading international competitors. Further, UK's share of patents filed at the EPO reflected the support the country gives to R&D activity. For example, in 2002, UK ranked second after Germany in biotechnology patents filed at the EPO by European countries. Germany share was 13.6 percent, while that of UK was 5.6 percent (OECD 2005). The UK's share was higher than the combined total of all other European countries excluding Germany, France, Netherlands, Denmark and Sweden.

Over the years, R&D funding as percentage of GDP had been erratic in Ghana. Ghana achieved the highest funding as a percentage GDP in 1986. Generally R&D funding as percentage of GDP was relatively better from 1975 – 1986. Since then the country's performance has slackened.

Overall, support in terms of research funding has largely been inadequate. For example, in 2004, 81 percent of Ghana government's budgetary allocation to the CSIR was for personal emoluments with only 9 percent for research activities (Gogo, 2004). Gogo argues further that not all of these operational funds are actually released. For instance, in 2003, only 74% of budgetary allocation for that year was released. However, this was an improvement between 15 – 23% over the previous years.

UK funding of R&D for the three years was close to 2.0 percent of GDP. In Ghana, the funding for the years was under 0.4 percent. In the UK, the private plays a key role in R&D funding. For example, in 2002, it contributed about 1.24 percent of GDP to R&D activities. There is no credible data on the level contribution by the private sector in Ghana towards R&D activities. Such contributions if any might be very low, since some of the private companies still have a wrong notion that R&D funding as a public activity which must be supported by the government. More importantly, most of the private companies are largely small scale and seem financially weak to adequately support R&D activities, but are likely to adopt and exploit scientific results to bolster their economic activities if they come with little or no cost to them. Another disturbing phenomenon is that the few large companies, especially the multinationals, which could passably support R&D in the country, mostly resort to laboratories of their parent companies for scientific support.

Another significant issue is the role donor agencies play in the funding of R&D activities in Ghana. Donor support is increasingly becoming an important component of R&D funding in Ghana. According to Gogo (2004), the donor component of the total R&D funding for 2004 was 48 percent. Gogo was quick to add that the figure could be higher as not all donor support are captured in the annual budget estimate. Though donors support governments in their efforts to fund R&D activities, this support may not be sustainable on the long run. Most often, the project ceases once the donor funding comes to an end. This raises questions about the purpose of such donor projects and whose interest the projects ultimately serve? There have been divergent opinions on this, but the important thing is that government should demonstrate

commitment by backing such projects with funding and make adequate arrangements to sustain such projects once the donor funding comes to a close.

Given the unsustainable nature and research priorities of most donor funding, efforts should be made by policy makers to find ways of allocating adequate resources for the R&D activities. This becomes a compelling issue, as there are equally important sectors competing with research activities for the limited available resources. Most often the politicians prefer to allocate more resources to sectors whose results are eminent in the short run so as to gain political advantage. These issues can be addressed within a policy framework that recognises the catalytic role S&T play in socio-economic development and even in politics. In view of this, there is the need to strengthen the capacity of the political structures, especially parliament to understand the indispensability of S&T in national development so that they can put high premium on S&T issues, especially funding. Special institution(s) which could provide technical support to parliament on S&T issues, as in UK is necessary. The success achieved by POST (as will be seen in the next section) in its work with the UK House of Commons is enviable. Scientific briefs, independent research reports, consultations and advisory services to the parliamentarians are some of the services a similar institution in Ghana and other African countries can provide to parliament. This will go a long way in deepening the competence of parliament in S&T matters.

5.0 Strategic S&T Policy Making Institutions

In the previous section, we discussed the institutional framework for S&T policy making in UK. The discussions here look in greater detail, two institutions which are crucial to policy making as well as integrating political authorities into the mainstream of S&T activities. The institutions are the Parliamentary Office for Science and Technology (POST) and the Office of Science and Technology (OST).

5.1 Parliamentary Office for Science and Technology (POST)

POST is an in-house independent body established in 1989 prompted largely by the setting up of the US Office of Technology Assessment in the United States (Cunningham, 2002). It was established out of the realization that parliamentarians were always confronted with S&T issues of which they have limited knowledge. Therefore, POST was to assist parliament to access expert knowledge and information on S&T and related issues. Its aim is to inform parliamentary debate on S&T through the provision of independent and balanced analysis of S&T issues. It works mainly with the Select Committee on S&T of the House of Commons. The House of Commons has oversight responsibilities over operations of POST.

The main activities of POST are:

- Publishing POSTnotes (short briefing notes) and detailed reports. Both focus on current S&T issues and with the aim of raising policy implications for parliamentarians;
- Supporting select committees, with informal advice, oral briefings, data analyses, background papers or follow-up research;
- Informing Houses of Commons and Lords about public dialogue activities in S&T;
- Organising discussions to stimulate debate on a wide range of topical issues, from small working groups to large lectures;
- Horizon-scanning to anticipate issues of S&T that are likely to impact on policy[16]

The establishment of an office dedicated to assist parliament with access to S&T information, briefings, clarifications and investigations among others, is very instructive and provides an avenue for building similar capacities within parliaments in Africa. This is because most parliaments in Africa are populated by 'professional' politicians that lack the scientific background to critically understand and articulate scientific issues with proficiency.

5.2 POST and Members of Parliament/Scientist Pairing Scheme

One important project which POST is involved is the Member of Parliament (MP)/ Scientist Pairing Scheme which was initiated by the Royal Society of UK in 2001 [17]. The Pairing Scheme was part of a larger project (Science in Society) launched in 2000 by the Royal Society as the result of the of the BSE crisis that hit the country in the early 1990s.

The pairing programme was borne out of the realisation to foster greater linkages between science and politics to bolster better understanding to deal with issues of great concern to society.

The aims of the programme are to:

- Help scientists recognise and understand the potential methods and structures through which they can feed

their scientific knowledge to parliamentarians and government;

- Help practicing research scientists to understand the pressures under which MPs operate;
- Give MPs the opportunity to forge direct links with a network of practicing scientists;

Give MPs the opportunity to familiarise themselves with the process of scientific understanding and topical research and ultimately to be able to bring this knowledge into better informed discussions and decision making (The Royal Society, 2005).

Under the scheme, the MPs and the scientists form a pairing relationship for a period between three to four months to help foster mutual understanding. For the four years the scheme has been in operation, 94 MPs have been paired with scientists in different laboratories, research institutes and universities. Figure 3 gives a breakdown of MPs from the various parties who have participated in the Scheme.

Taking a global picture, the number of MPs who have participated in the scheme formed only about 15 percent of the total MPs in UK's parliament. However, the fact that the MPs have declared their avid interest and participated in the scheme is a step in the right direction, and also provides positive implications for their counterparts in Ghana.

Arguing for the need for parliamentarians to be abreast with scientific issues, Kass is of the opinion that legislators can and do influence S&T in a number of ways:

Approving overall levels of public expenditure on research and development (R&D);

Formulating, debating, amending and approving laws to ban or regulate certain technological developments, such as human cloning;

Raising issues of concern to the citizens they represent, and bringing pressure on governments to act in response to these concerns; .

Scrutinising the work of governments to ensure that they are accountable for their decisions and actions. (Kass, 2000:322).

The importance of building the capacity of MPs in scientific issues is buttressed by the fact that parliamentary questions on S&T have increased in UK. Analysis by Padilla and Gibson (2000) revealed that the percentage of questions related to S&T has risen over the past 10 years from less than 1% in 1988–89 to around 6% in 1998–99. As argued by Padilla and Gibson, the increase of parliamentary questions on S&T was not due to the activities of neither POST nor the pairing scheme but the increasing importance of S&T in UK's society. Therefore, it underscores the need to strengthen the capacity of the MPs to grasp them to exercise their responsibilities with distinction, as S&T.

Some of the experiences of POST need to be highlighted. POST was set up to assist parliament and therefore, it is strictly not an arm of the executive. It is accountable to parliament and not the government. It has gained, and has been able to maintain credibility among the political divide in UK which is a lesson to be learnt by all institutions established to assist parliament in its work in the area of S&T. The credibility was achieved through balanced judgements, neutrality in all its activities and publications.

Further, POST enjoys a good relationship with the scientific community. For example, it has a good relation with the Royal Society in terms of participating in joint programmes and hosting fellows, researchers and scholars from the Royal Society. In this way, it benefits from the expertise of the scientific community in the preparation of Postnotes and detailed reports on topical issues affecting the country. This has improved the quality of its publications and consequently provided a good image for the office.

5.3 Office of Science and Technology (OST)

OST was formed in 1992 as a result of the merger between the former science branch of the Department of Education and Science, and the Office of the Chief Scientific Adviser in the Cabinet Office[18]. In 1995, OST was moved to the Department of Technology and Industry in order to improve links between government, industry and the science and engineering base of the country. The move, as stated, was to enable OST to work more closely with the DTI in encouraging businesses to make effective use of the science. The objectives of OST are to:

- Sustain and improve the science and engineering base;
- Improve the performance of government departments using science and technology;
- Improve the flow of people and ideas between the science and engineering base and users;
- Improve engagement between science and the rest of society[19];

Ensure sound advice is given to Ministers and the Government on science issues.

OST is also responsible for the allocation of the science budget (currently over £3 billion per annum) through the Research Councils for S&T activities in the country. The office consists of two key divisions namely; the Science and Engineering Base Group (SEBG) and the Transdepartmental Science and Technology Group (TDSTG). The TDSTG supports the Chief Scientific Adviser in his/her advisory services to the government on SET matters, while the SEBG assists the Director General of the Research Councils among others to allocate science budget among the seven Research Councils, which are the OST's principal associated public bodies.

It also provides assistance to a number of commissions and committees which advise government on or formulate policy with respect to S&T issues. The bodies include:

⇒ Agriculture and Environment Biotechnology Commission

⇒ Council for Science and Technology

⇒ Ministerial Committees on Science Policy (SCI) and Sub Ministerial Committee on Biotechnology

⇒ Natural Hazard Working Group

6.0 Implications for Developing Countries

The S&T policy making process in UK with its attendant specialised or strategic institutions presents a number of insights that could also be useful for Ghana and other African countries. These insights could potentially help transform and energise the status of S&T as well as fostering strong partnership between science and politics in African countries. This section looks at some policy issues that can galvanise the development of S&T, as well as create synergy between scientists and politicians in Ghana.

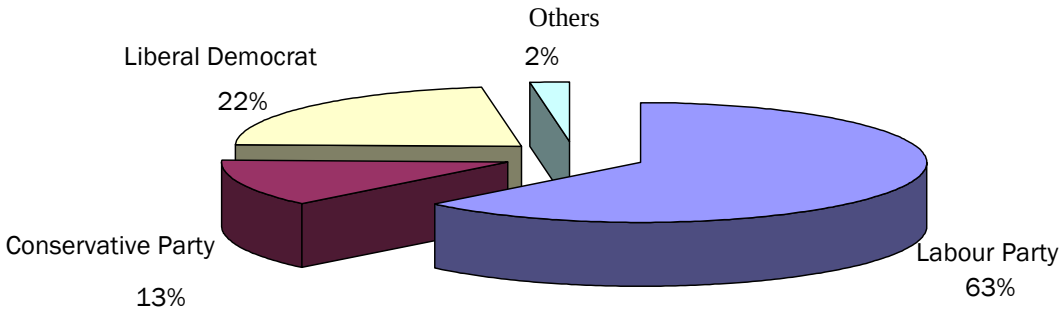
6.1 Establishment of Chief Scientific Advisor (CSA) Position

The UK experience has shown the existence of a CSA who plays a key role in SET policy making process. Though the CSA is physically located in DTI, he/she has direct reporting links to the Prime Minister's Office. The CSA, as we discussed sits on every scientific advisory committee and coordinates research in both government departments and within the Research Councils. The position and wide ranging powers of the CSA epitomises the seriousness the UK government attaches to SET issues.

6.1.1 Chief Scientific Advisors for Africa

The existence of a similar office to coordinate research and advice to governments or presidents/prime ministers on S&T issues has not been part of the institutional set-up for S&T policy making in most African countries. As is in most African countries, Ghana has no institutionalised scientific advisors for presidents or the cabinet. Most often, it is the Minister for Science who speaks on science at cabinet meetings, but experience has shown that such ministers are often just politicians who lack scientific background to articulate S&T issues. Though this position is a cabinet one, it is normally occupied by junior ministers who are not well established in the ruling government, and therefore, has little political clout to influence discussions, especially budgetary allocations during cabinet meetings. In effect, such ministers are unable to introduce science into the development agenda in their countries. There is the need for an independent scientific advisor of high stature to advice governments on S&T issues. However, due to pressure on

Figure 5: Number of MPs Participated in Pairing Scheme (2001 - 2005)



Source: The Royal Society, 2005

national budgets, no elaborate office should be established (as the case is in UK) for the CSA but should be integrated into the Office of the President/Prime Minister.

The establishment or the appointment of a scientific advisor at the highest level of government will allow the president or prime minister to have access to independent scientific advice. The CSA, having the coordinating role of S&T activities across ministries will reduce problems encountered by most Ministries of Science in coordinating cross-sectoral S&T activities.

Nigeria has taken the lead to establish the position of CSA in their political system. In Ghana, discussions have been on-going for a long time with no decision in sight. The various governments have developed cold feet towards the establishment of such an office.

Given the realisation that African countries can overcome underdevelopment - poverty, famine, poor health and malnutrition, poor agricultural and industrial performance only through the integration, development and application of S&T to their developmental efforts, it is necessary that S&T issues be entrenched in the government's administrative machinery. However, Ghana should avoid repeating UK's mistake of establishing numerous advisory bodies which it might be difficult to resource and maintain synergy among them (Cunningham, 2002).

6.1.2 Science Advisors in Ministries

Another interesting development in the UK S&T institutional policy process is the existence of science advisors in government ministries and departments. In the UK every, government department with significant science and/or technology elements within its portfolio has a Chief Scientist who is responsible for S&T issues and provides a channel of communication for these issues, usually via membership of a range of committees. It is a safety valve to help civil servants who might be handicapped in scientific issues related to their offices.

In many instances, ministers rely on their technocrats for advice, however, we are living in an era where there is an acceleration of scientific knowledge, and most often such civil servants are overwhelmed by administrative issues to the extent that they are unable to tract scientific developments related to their ministries. Therefore, the scientific adviser for the ministry will fill in this gap.

Ghana has made some efforts in this direction by creating the position of Special Assistants to the Ministers. These Special Assistants are supposed to be specialists in the ministries assigned to them and are to provide technical knowledge which supposedly, is not available in the ministry to aid the minister in decision making. This comes close to the situation in UK, but the experience is that such positions have been more of political rewards, with most of them having little competence in S&T issues specific to their ministries.

Having scientific advisors at the ministerial levels can contribute to rich repertoire of scientific expertise which could be tapped into the general S&T policy making machinery of the country. Such positions should not be political rewards but an integral part of S&T policy making process of the country.

6.2 Establishment of a Parliamentary Scientific Support Unit

The environment we are living is being dictated by S&T, therefore, law makers should have the capacity to understand science, so as to make independent judgements on the scientific advice and also legislate on S&T issues with competence. More importantly, they should also be helped to understand the modus operandi of science. The complexity of modern S&T underpins the need for parliamentarians to be assisted through scientific briefings and access to balanced research materials and ex-ante and ex-post policy research into emerging issues that are likely to affect the country and its citizens.

In the UK, this handicap has been minimised through the establishment of POST to give scientific support to parliament. The establishment of similar offices to assist parliaments of SSA is worthy of consideration. MPs in SSA are equally handicapped just like their counterparts in UK. The select committees can use these offices to gain better understanding of protocols of international issues, for example, global warming and climatic change, and controversial issues such as genetic engineering, stem cell research, biotechnology, genomics and nanotechnology among others. It will boost the capacity of parliament to periodically review government's S&T policies so as to put steam into those policies. The critical issue is whether parliament has the financial resources to support this unit in Africa? A way out is to use and resource an existing policy research institution to provide support for parliament.

6.3 Replicating MP/Scientist Pairing Scheme

The MP/Scientist Pairing Scheme is a positive move to bridge the 'divide' between politicians and scientists. In Ghana, a better partnership between the politicians (MPs) and scientists is also critical, as there is a seeming 'animosity' between scientists and politicians, especially

when it comes to sharing national resources. The politicians have always accused the scientific community as being non-performing national assets, while scientists on their part, have accused the politicians of not devoting much resources to scientific activities, as well as not according science top priority in national development activities.

Such an initiative, which has proved successful in UK, can be adopted by Ghana as one of the mechanisms to ensure a better understanding between scientists and politicians. It is worth stating that the Royal Society of UK has already started consultation with similar Societies (Academies) in Africa to establish similar schemes in Africa.

Linked to the issue being discussed is the role played by S&T professional bodies in policy formulation and the advancement of S&T in the country. There are a number of S&T professional associations such as Ghana Academy of Arts and Sciences, Ghana Institute of Engineers, Ghana Medical Association, Ghana Biological Sciences Association, Ghana Science Association and Ghana Science Teachers' Association among others. Most of these bodies made inputs into the formulation of the national science policy and address critical issues that border on science during their meetings or public lectures.

Collectively, the influence of these bodies on S&T development in the country had been minimal as most of them have turned into trade unions. For example, the Research Staff Association of the CSIR, University Teachers' Association of Ghana and Ghana Medical Association, among others are more interested in fighting for better working conditions for their staff rather than championing S&T development in the country.

7.0 Conclusion

The paper has revealed that UK has put in place an elaborate institutional framework for S&T policy making. The contrast is sharp in the case of Ghana where no apex body has been established to drive an S&T policy agenda into national politics. The institutional setup to forge deeper collaboration between scientists and political authority is also absent in Ghana. This illustrates the weak recognition given to S&T in national development efforts as well as in the integration of the political structures into S&T development and management.

Also, the paper revealed the existence of frameworks in the UK to support and commit more resources to the already developed S&T capacity. The UK's funding of S&T as a percentage of the country's GDP is 2.0, however, the highest S&T funding in Ghana was achieved in 1986, and since then the percentage of GDP committed to R&D had hovered around 0.3 percent. This situation is largely due to lack of deeper appreciation by the policy makers and political structures of the catalytic role S&T could play in national development.

Therefore, Ghana and the other African countries can critically look at the experiences of the UK in order to replicate some of these experiences in their national economies, especially the appointment of Chief Scientific Advisor, Scientific advisors in Ministerial and special S&T support units for parliaments to direct S&T policy making process, but this should be attuned to local conditions. The effectiveness of these institutions and programmes in the S&T development process of UK cannot be taken for granted in Africa. Therefore, it is important that Ghana revolutionalises its S&T policy making set-up to take on-board structures which could positively enhance S&T development in the local context. It is hoped that these initiatives will achieve the desired results - development of an effective S&T policy making framework and placing S&T on a higher pedestal of the national development programmes through allocation of adequate resources and effective implementation of S&T policies

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Notes

1. http://www.foresight.gov.uk/About_Foresight/The_Programme2002/Foresight_2002.html

2. Triadic patent families are a set of patents taken at the European Patents Office, Japan Patent Office and USA Patent Trademark Office

3. http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/399/399we57.htm

4. The CSIR was re-established by CSIR Act 1996 (Act 521).

5. Kenya has the National Council for Science and Technology, while in the case of Uganda, it is hasNational Council for Science and Technology. And Zambian has the National Science and Technology Council (http://www.nstc.org.zm/legislation.html), Kenya and Zambia have Science Academies too.

6. http://www.uschina.org/info/chops/2006/foreign-

trade.html

7. There are 78 countries in the ACP Region. These countries adopted in 1997 a Declaration in Libreville that aims to improve development cooperation between ACP countries and the EU. This Declaration was preceded by the Lome Convention which came into effect in 1976. The Libreville Declaration placed on top priority the development of human resources, increased access to S&T, especially information technology and financing of research relevant to socio-economic development. (See http://www.acpsec.org/gb/declar/final_gb.htm)

8. The CSSs outline a country's development strategies, analyze its situation and suggest an EU response to critical sectors, taking the role and activities of other donors into account.

9. There will be detailed discussion on the OST in later sections.

10. Recent examples of House of Lords Select Committee on S&T reports include : Fish Stock Conservation and Management; Decommissioning of Oil and Gas Installations; Information Society: Agenda for Action in the UK; Towards Zero Emissions for Road Transport; EU Framework Programme for European Research and Technological Development; Innovation-Exploitation Barrier; and, Sustainable Management of North Sea Fisheries.

11. In the ministerial reshuffling which took place during the second quarter of 2006, a number of ministries were realigned. The Ministry of Science and Environment was among the ministries that were affected. The science portfolio was added to the Ministry of Education and Sports, while the environment was added to the Ministry of Local Government and Rural Development. Though Figure 2 incorporates the new changes, the discussions centre on the former mandates of the affected ministries, as the mandates of the affected ministries are being reformulated.

12. This amount is an addition to the normal government budget for SET.

13. http://www.ost.gov.uk/policy/investinnov.htm#Research%20Funding%20and%20Policy. Retrieved on 4th March 2006

14. The European Union, to ensure its competitiveness in the global scientific field has a policy for its member countries to commit 3.0 of their GDP to scientific research.

15. UK was third after USA (29.5 percent) and France (28.3) in high-tech manufacturing activities.

16. http://www.parliament.uk/parliamentary_offices/post/links.cfm Retrieved on 4th March, 2006

17. The Royal Society is UK's National Academy of Science

18. See http://www.ost.gov.uk/about_ost/index.htm#History%20of%20OST Retrieved on 6th March, 2006

19. See http://www.ost.gov.uk/about_ost/index.htm Retrieved on 6th March, 2006