

HOW TO BE A GLOBAL PLAYER: A GRASSROOTS' APPROACH TO TECHNICAL AND SCIENTIFIC COMPETENCE OF THE NEXT GENERATION

**TEXT OF THE 1ST COLLEGE OF NATURAL SCIENCES
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SCIENCES, JOSEPH AYO BABALOLA UNIVERSITY,
IKEJI-ARAKEJI, OSUN STATE. ON 21ST MAY 2009.**

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- Distinguished Ladies and Gentlemen

Kindly permit me to commence this lecture by expressing my profound gratitude to the Almighty God, for giving His visionary servant Pastor E.H.L. Olusheyeye, the President of Christ Apostolic Church Worldwide, the prophecy to establish Joseph Ayo Babalola University, a University which has since been nurtured with

the help of the Almighty God within the space of two and a half years to this enviable status. I wish to thank the Governing Council of the University for working assiduously to make Joseph Ayo Babalola University, one of the best Universities, not only in Nigeria, but in the world. I pray that God will crown your efforts with success.

HOW TO BE A GLOBAL PLAYER: A GRASSROOTS' APPROACH TO TECHNICAL AND SCIENTIFIC COMPETENCE OF THE NEXT GENERATION

Introduction

In this lecture which is the first in the College of Natural Sciences, I will be speaking on: "How to be a global player: A grassroots' approach to technical and scientific competence of the next generation".

What is Globalization? Globalization is a process of interaction and integration among the people, companies and governments of different nations, a process driven by international trade and investment and aided by information technology.

It is Edward Young who said; "At thirty man suspects himself a fool; knows it at forty and reforms his plan". At almost 50, Nigeria, our country, the giant of Africa, still needs to do a lot more as far as technical and scientific competence is concerned, in order to earn global respect. An old Chinese proverb says: "Give a person a fish: you have fed the person for today. Teach a person to fish: you have fed the person for a lifetime". In global economy, one more level needs to be added for a developing country like Nigeria: And: teach the person how to process and package fish for export and market it, and you have stimulated economic development.

For Nigeria to develop economically there is an urgent need to get her unto the path of technical and scientific competence. This would involve significant

investment in people and resources, as well as fundamental changes in attitude on the part of the Establishment.

EDUCATION IN THE BEGINNING

Nigeria education has evolved through a number of phases. The education system in Nigeria has been formed by a number of influences, - the colonial influence, the influence of the military rule in Nigeria and then the impact of independence and a new constitution. Nigeria education was slowly but soundly developing during the colonial time until the conclusion of World War II.

Some of us have observed with dismay the downtrend in the standard of education in this country. Education in the 1950s and 60s is what I confidently call real education. At independence, and for most part in the 1960s, education was seen as the key to economic, technological and intellectual development of the nation. Education programmes were implemented alongside agricultural extension services, which encouraged increased food production. The oil boom in the 70s skewed this outlook. Education was neglected and expenditure on education dwindled with the resultant low level of literacy.

Table 1: Literacy rate in Selected Countries

Country	% Ratio of the Population
Brazil	89
China	91
Egypt	71
Kenya	74
Malaysia	89
Nigeria	69
Tunisia	74
Zimbabwe	89

Source: World Bank Development Report, 2008.

The above statistics of the World Bank shows that Nigeria is the least educated among the countries listed. Since education has been down played, little wonder the country's human poverty index in 1999 was 41.6%, placing Nigeria among the 25 poorest nations in the world. Today, about 2/3rd of the population or over 80 million Nigerians are said to be poor, notwithstanding that since independence we have realized more than \$300billion in oil and gas revenues and development bids alone.

Also, enrollment in science education in Nigeria is lower than what is stipulated in the policy statement on education. Science to non-science targeted proportion was put at 60% - 40% in conventional universities; 70% - 30% in polytechnics and 80% - 20% in Federal Universities of Technology. In compliance with national policy, the overall percentage of science and engineering enrollment in the Federal Universities hovered between 50 and 60 percent from 1999 – 2005.

Table 2: Enrollment and Graduate Output by Faculty in Nigeria's Federal Universities 1999/2005

Faculty	Enrollment	Graduate Output
Admin	19,512	6,411
Agric	20,874	3,093
Arts	23,771	8,752
Education	33,458	11,085
Engr/Tech	39,229	5,325
Envr. Sciences	10,866	1,423
Law	13,656	3,072
Medicine	20,725	2,187
Pharmacy	4,879	553
Sciences	59,533	10,088
Social Sciences	51,797	14,785
Vet. Med	2,318	251

Source: World Bank 2006

There are, however, two causes for concern. Firstly, there is a question around whether the numbers enrolled in different Science and Technology courses actually meets labour market needs as there appears to be shortages in some areas (such as telecommunications) and over production in others. Secondly, a question arises on graduation rates. The number of graduate output suggests that there might be high failure rates in some programmes.

Science and Technology is acknowledged within Nigeria's National Economic Empowerment and Development Strategy (NEEDS) as key to Nigeria's economic

and social development. For Nigeria to remain a giant and be relevant in the 21st century, something has to be done. Oil and gas and solid minerals will not save Nigeria's development, but rather the application of the benefits accruing from resources exploitation in the development of human capital. Science education is central to the accomplishment of the economic development of any nation.

Examples of countries that have developed economically using education as a pivot include China, India, Japan, South Korea and Singapore. Without improved standard of education, especially Science and Technology in our Universities, Nigeria will not attain global relevance and will not create a good society or an informed citizenry.

According to Mandela (2005) – “Education is the greatest engine of personal development. It is through education that the daughter of a peasant farmer can become a doctor, that the son of a mine worker can become the head of the mine, that the child of farm workers can become the president of a great nation”.

Public Spending On Education

Table 3 shows Nigeria invests the least amount (0.76% of her GNP) on education when compared to other African countries. South Africa invests 7.9%. Investing in education is not only an important way to build a nation's human capital and to improve its prospects for economic growth and higher living standards. It broadens people's horizons and helps people to live healthier, more financially secure, and more fulfilling lives. This is why experts use data on literacy, for example, as an important indicator of the quality of life in a country.

Table 3: Spending on Education (%GNP) for some African Countries as compared to Nigeria

Country	GNP (%)
Angola	4.9
Cote d' Ivoier	5.0
Ghana	4.4
Kenya	6.5
Malawi	5.4
Mozambique	4.1
Nigeria	0.76
South Africa	7.9
Tanzania	3.4
Uganda	2.6

Source: Intrigues in FG-ASUU Face-off; 2001.

Aside from general education, science-based education is required in a knowledge-based post industrial society. Most of the economic leaps of the 20th century and later have been driven by new scientific discoveries. These discoveries were harnessed to yield innovative products and services. These in turn resulted in immense economic gains and creation of new wealth. Science led to the invention of radio, television, mobile phones and information technology, to name just a few. Therefore, any nation ignores science at its own peril, while those nations which invest heavily in education, especially science education, have much higher probability of developing new products and services.

Science and technology are one, if not the greatest, achievement of contemporary society, and knowledge thereof is an essential prerequisite for the educated individual. We must ensure an adequate supply of scientifically trained

individuals to develop and be part of the advanced industrial society. As a matter of fact, educating the populace in science and technology is an essential requirement to sustain a healthy democratic society.

FIGURE 1: CHANGES IN CAPACITY COMPETITIVENESS

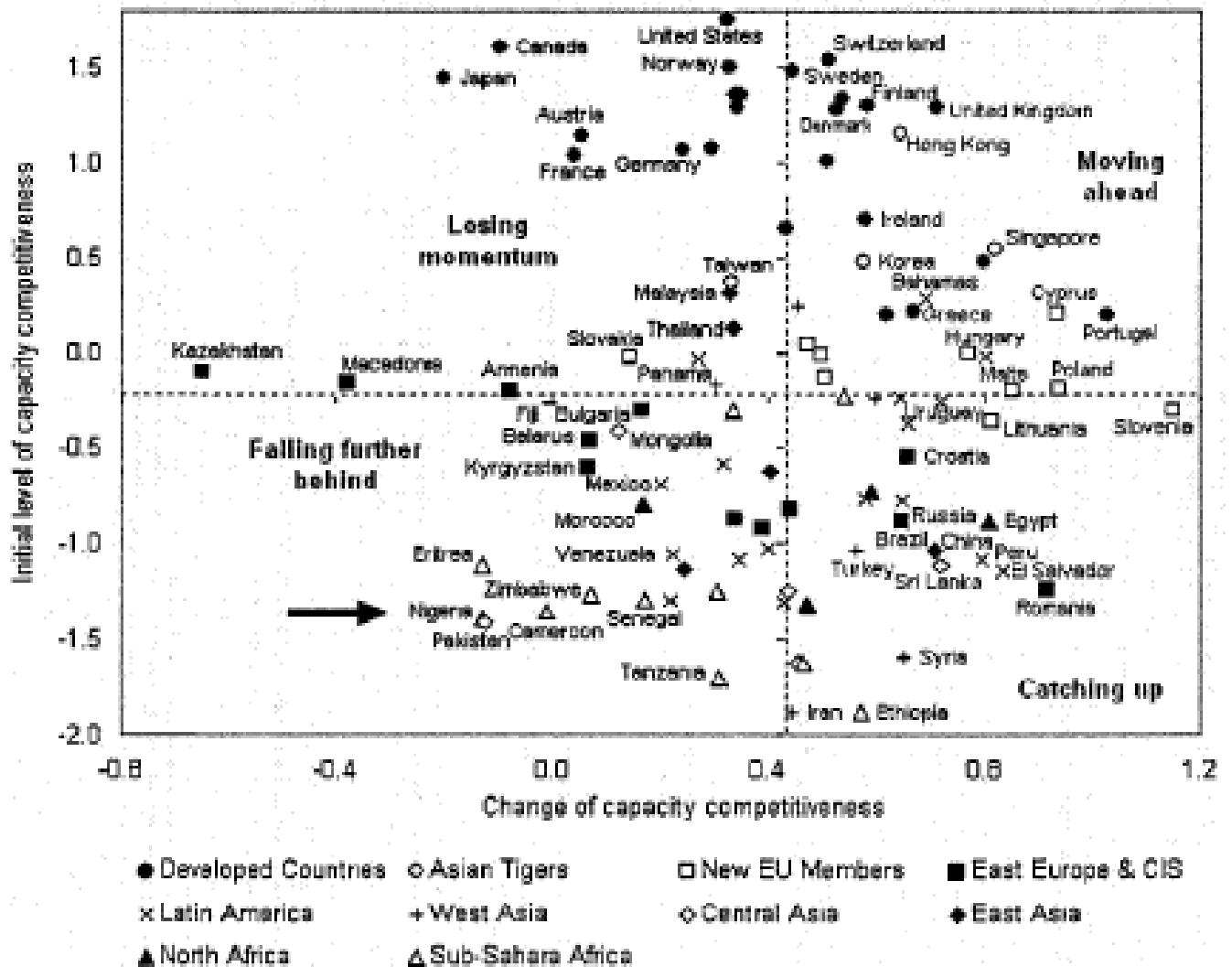


Figure 1 shows Nigeria in comparison to several other countries globally as a function of its capacity competitiveness. The industrialized leaders put strong

emphasis on three dimensions: education, science and technology and the appropriate policy to encourage innovation which leads to growth. Nigeria joins the ranks of Cameroon and Pakistan – countries that are falling in these three areas. The policy that might stimulate Nigeria to move towards the upper right in this Fig 1, closer to countries such as Singapore, Taiwan and South Korea would include: (1) a repositioning of the Universities to respond more directly to the needs of Industry, (2) an emphasis on entrepreneurial skills and technological education to enhance technological competitiveness, (3) prioritization and specialization of rapidly growing key sectors for industrial growth and (4) fostering close relationships between academia, industry and research Institutes for Research and Development.

Available data indicate low levels of investment in Science and Technology education and Research Capacity, which likely contributes significantly to the weakness of Nigeria's non-oil economy.

There is an increasingly, level ground for global science. Nigeria lags too far behind the West in Science and Technology and needs to boost her scientific capabilities or else risk its future. In the 1980s, the economic case for science education was successful in arguing that science should be a compulsory part of all school curricula in many countries across the globe. The outcome, however, was the imposition of a model of science education designed for the small minority of children who would go on to become scientists. However, our country still lacks significant Science, Technology and Innovation capacity.

We should have a national science and technology vision of becoming a nation that is competent, confident and innovative in harnessing, utilizing and advancing science and technology that will achieve the Millennium Development Goals. Countries such as Malaysia, India, China and Brazil have increased their Research and Development spending to between 1.5 – 2.0 percent of Gross Domestic Product (GDP) in an effort to enhance their national capacities in R&D. Many Nigerian academics now go to Brazil and Malaysia and even South Africa etc in order to carry out post-doctoral and other grant-related and meaningful researches. Brazil in 2007 plowed 28 billion dollars into Science and Technology. The President of Brazil then said “The sacrifice we made in 2003 and 2004 allows me to tell you today that from 2010, you will see a much better Brazil of many more opportunities.” I hope our Political leaders will take a cue from that. As for China, total investment into their nine major Science and Technology projects for civil use will reach 690 billion yen by 2020.

STRENGTHENING OUR SCIENCE BASE

1. *Knowledge Sharing:* We as scientists, engineers and technologists generally believe that our professions know no borders. We read journal articles to gain knowledge irrespective of where the experiments were done. We travel to conferences all over the world, sharing our knowledge with anyone who wishes to listen. In the 60s, during the Cold War, I was in Poland; The Polish scientists were going to Conferences in the West; they

were reading and sending scientific articles to Western scientific Journals for publication, ignoring the headlines that made them out to be enemies.

2. *Richness of Ideas and Experiments:* A good idea is a treasure, no matter what mind conceives it. The stronger Nigeria science is, the more ideas will bubble up, and the richer will be the brew of ideas and experiments that each of us can draw upon.
3. *Sound Capacity building:* The other side is that we want our own country to be strong. In order to achieve this, we must develop a sufficient pool of well-educated and certified scientists, technologists and engineering graduates in the country to move the country forward. This is what I call capacity building; a dedication to the strengthening of economy, government, institutions and individuals through education, training, mentoring, and the infusion of resources. It aims at developing secure, stable and sustainable structures, systems and organizations with particular emphasis on using motivation and inspiration for people to improve their lives.
4. *Installation of Accelerated Development Process:* For Nigeria, a strong economy, good health programmes, security and ability to live fulfilling and peaceful lives will depend on maintaining a strong base in Science and Technology. The building of scientific capacity is a main reason for the economic progress of countries like China, India, Brazil, Turkey and Mexico.

5. *Enhanced capability to compete in the dynamic global economy:* We see this impact in the emergence of Brazil as a leader in the development of biofuels. We see it in the growing prowess of China in nanoscience and nanotechnology. This is what sustains America and other developed countries of the world. Even now, the United States and the West are still calling for programmes to strengthen their science and technology, so that they can compete in the newly global economy.

6. *National Pride:* The new U.S. President Barack Obama has a vision of a scientific America. It is no wonder, then, that 76 American Nobel Laureates publicly supported Barack Obama during his campaign. He understands, at least, according to his campaign literature that science has the power to improve life profoundly. He, therefore, pledged to increase tremendously federal funding for science and increase research and development fund to 3 percent of GDP. Similarly, the British Prime Minister recently supported and funded plans for a world class research centre to tackle some of the biggest biomedical challenges of the 21st century: A public-private UK centre for Medical research and Innovation.

RESULTS OF PREVIOUS EFFORTS

In fairness to them, the various Government administrations in the country from the colonial era till today have put in place various policy programmes to address Education in Nigeria. Before that, however, let us ask ourselves, the question:

What are the causes of the terrible state of education we are experiencing in the country? The causes include among others:

- Corruption
- Bad governance
- Debt over-hang
- Unemployment
- Low productivity
- Burgeoning population growth
- Globalization
- Unfocused government policies
- Lack of effective skill training

Successive governments have tried to address some of these issues through various policy programmes:

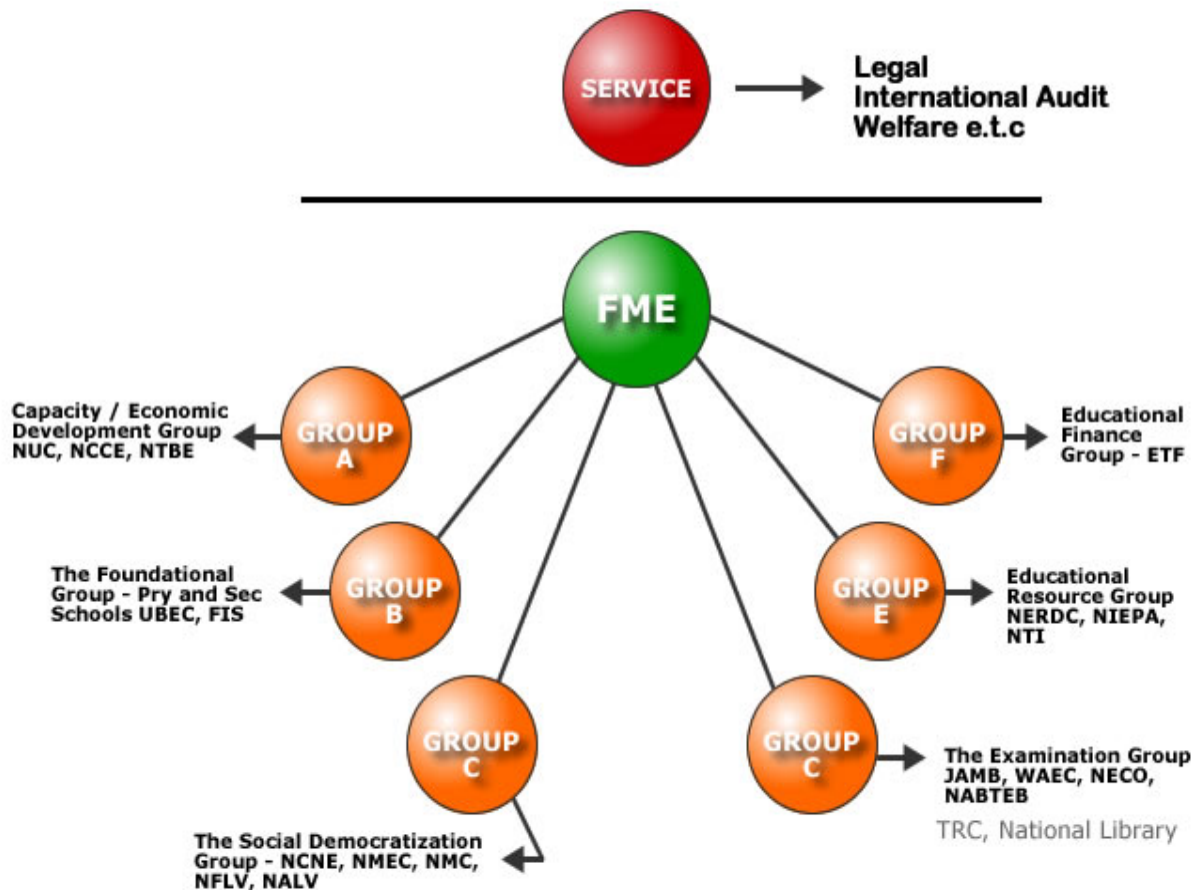
TABLE 4: VARIOUS POLICY PROGRAMMES TO ADDRESS EDUCATION IN NIGERIA

PROGRAMME	YEAR	HEAD OF GOVERNMENT
The Ten-Year Education Development Plan	1946 – 1955	Colonial
The Education Ordinance	1948	Colonial
National Policy on Education	1976,1977, 1981, 1998, 2004	Various Administrations
Nigeria National Computer Policy	1988	Babangida
Nigerian Mathematical Centre	1989	Babangida
FGN/UNDP Mass Literacy Programme	1994	Abacha
UNESCO/UNICEF Learning Achievement Programme in Nigeria	1994	Abacha
FGN/UNICEF Programme on Education	1994-1996	Abacha
World Bank Primary Education Project	1994-1996	Abacha
University Autonomy Policy	2000	Obasanjo
National Polytechnic Commission	2003	Obasanjo

Source: Federal Ministry of Education, FOS, Literatures etc.

Figure 2: Parastatals on Education

New Parastatal Groupings



Source: Federal Ministry of Education, 2009

We can see that:

- Previous efforts have tried to use foreign aid investment in machines, fostering education at the primary and secondary levels, sustaining education at the tertiary levels through ETF, controlling population growth, and giving loans and debt relief conditional on reforms to stimulate the economic growth that would allow the country to move towards self sufficiency.

- All of these efforts over the past few decades have failed to lead to the desired economic growth. Nigeria has forsaken God.

Something happened about 79 years ago when darkness was very pronounced in Africa. An anointed man of God, who is celebrated as the pioneer of African Pentecostal Movement: Apostle Joseph Ayo Babalola, was used mightily by God to destroy evil powers, demonic agents, powerful idols etc. Unfortunately, Nigeria has back-slided to the extent that the church of satan has found its way to Nigeria. In Isaiah 42 verse 8, God said: I am the Lord: that is my name: and my glory will I not give to graven images”. Nigeria must come back to God.

THE WAY FORWARD

I would like to recommend the following grassroots’ approaches in order to attain technical and scientific competence in the country:

1. The Infrastructure must Function

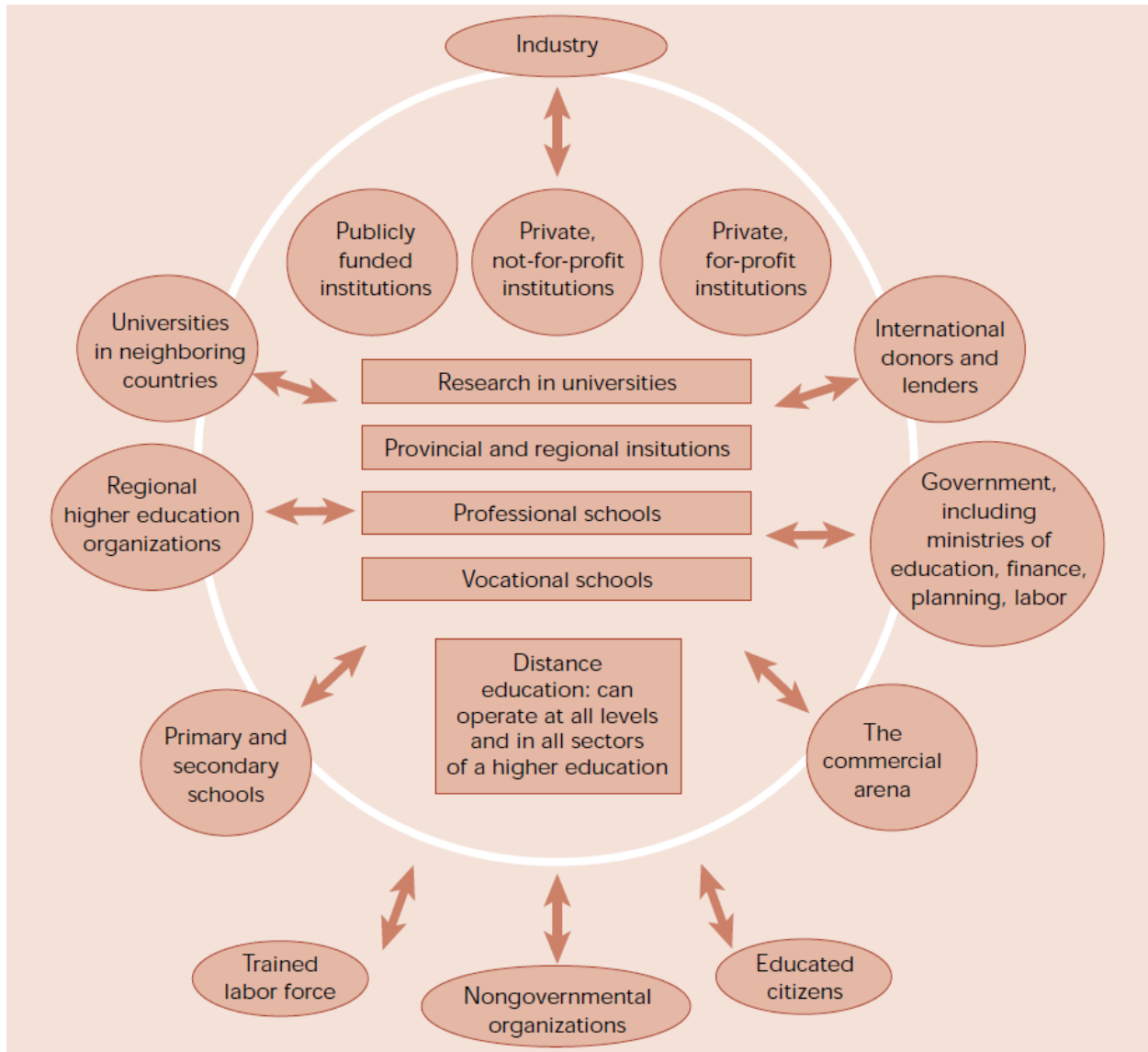
The Government should make the infrastructure to function. If there is any singular thing that should be addressed first, it is power supply. There is no excuse for inability to supply electricity when and where it is needed. The world has been running on electricity for more than a century. There is no way forward if we cannot provide power supply to our research organizations, laboratories, hospitals and industries. If power supply is secured in Nigeria, it will be amazing to see what will be achieved within a year.

There are others such as portable water, good roads and telecommunications. These are taken for granted in civilized societies.

2. **Re-Invention of the Universities**

i. Why the Universities should be re-invented? Re-inventing the University is premised on an acceptance of the failure of the University system, in its present state to attain the ideals of the University or its failure to find relevance in contemporary times. The University system in Nigeria is due for a complete overhaul.

Figure 3: Schematic Representation of a Differentiated Higher Education System



Source: World Bank, 2000

(Figure 3 graphically depicts a differentiated higher education system and its place in society.) There should be linkage between University and industry whether publicly or privately funded. Symbiotic relationship should be the order, whereby industry funds research in the universities and as well make use of the results and the university becoming manpower pool for the industry. The system is not sealed from the outside world: it is at least loosely bound to the overall education system, for example, to secondary schools that provide most of its new

students. It is connected to the labour market and the business community, and to various government departments that set the policy environment in which it operates. It also has international links, to regional and global higher education communities, as well as to Bilateral and Multilateral donors, Foundations, and Nongovernmental Organizations.

Take a case study of the B.Sc. Biochemistry curriculum, a rough estimate shows that less than 10% of the graduates over a period of five years from one University actually worked in areas related to their training. What a waste of time and resources for the remaining 90%. The same applies for all fields. It might be helpful to formulate the teaching and training policies of the Universities to better reflect the actual needs of the economy.

- ii. Staff Competence and redesigning of curricula to fit societal needs: For a start, it would be useful to set new requirements for new entrants into the academia to ensure that we initiate a generation of academic leaders who are in touch with the needs of the country. The resourcefulness and the exacting standards inherent in the older generation academics will serve as character – forging support for the younger ones. It will be necessary to retrain staff.

In designing new curricula, some University Departments may have to be rationalized; this is an issue that is very controversial and sensitive. The curricula must take cognizance of the needs of the immediate society and the nation. In such curricula, environmental issues which are challenging the solidity of disciplinary boundaries should be addressed. Issues that

border on the Millennium Development Goals (MDGs) should be included, and our graduates repositioned to proffer solutions to the challenges posed by the MDGs.

- iii Unifying Teaching and Research: Integrating teaching with research will benefit both and will ensure that there is always a pool of people trained to work at the forefront of their fields. In newly established Universities, this unity is lacking, thus endangering continuity and shortchanging students. The National Universities Commission may wish to change the policy of delaying post-graduate programmes in new Universities until they have produced the first crop of graduates.
- iv Private Universities: Private Universities is an attempt at reinventing the University system. Private Universities find it easier than Government-owned Universities to draw up the curricula to meet the aspirations and objectives for which the Universities were established; and prudently use available resources to achieve set goals. The management of private universities has intimate and full control over the discharge of duties by all staff.

In Joseph Ayo Babalola University we have included a lot of skill acquisition which will allow our students to be job creators rather than job seekers after graduation. Those in the sciences from 100 – 300 level are exposed to the art of industrial production. They carry out scientific projects relating to the preparation of products which have relevance in the Nigerian society. It is our belief that this will encourage and sensitize them to think of starting small scale industry after

graduating. We must realize that many current International Companies started as a one-man business. Students should be made to understand that Government is not the only employer of labour. The Government should be more responsible for creating the enabling environment.

All teachings in our Universities should be computerized and every student should be made to own a laptop. Internet facilities should be made available to both staff and students 24hours a day. In Joseph Ayo Babalola University, work is on to see that our teaching is fully computerized.

The importance and relevance of Private Universities in providing quality education is clearly demonstrated in the THES QS World University ranking, which showed that among the best twenty universities in the world, eleven are Private Universities and the best two are Private Universities: Harvard University, Yale University (see Table below).

TABLE 5: THES-QS World University Ranking (Top 20)

2008 ranking	2007 ranking	2006 ranking	2005 ranking	2004 ranking	University	Country	Average Score
01	01	01	01	01	Harvard University	US	01
02	02	04	07	08	Yale University	US	05
03	02	02	03	06	University of Cambridge	UK	03
04	02	03	04	05	University of Oxford	UK	04
05	07	07	08	04	CIT***	US	06
06	05	09	13	14	Imperial College London	UK	09
07	09	25	28	34	University College London	UK	21
08	07	11	17	13	University of Chicago	US	11
09	10	04	02	03	MIT*	US	06
10	11	12	20	19	Columbia University	US	14
11	14	26	32	28	University of Pennsylv.	US	22
12	06	10	09	09	Princeton University	US	09
13	13	13	11	52	Duke University	US	20
13	15	23	27	25	John Hopkins University	US	21
15	20	15	14	23	Cornell University	US	17
16	16	16	23	16	ANU**	Australia	17
18	38	29	36	31	University of Michigan	US	30
19	17	19	16	12	University of Tokyo	Japan	17
20	12	21	24	21	McGill University	Canada	20

Private Universities are in bold. Massachusetts Institute of Technology The Australian National University** California Institute of Technology****

Government has introduced the Education Trust Fund for sustainability of University education. Sadly, however, only Government owned Universities (Federal and State) benefit from the fund as at present. Private Universities should be allowed to benefit from the ETF because the manpower they produce yearly return into the society and contribute to the nation's economy. Appropriate legislation should be enacted urgently in order to address this anomaly.

3. **Involvement with Local Communities**

Many Universities have one or more communities within a few kilometers of their campus. We must make concerted efforts to inter-relate with these local communities. We take JABU as an example, our College of Agriculture is already making concerted efforts to make farm produce more available in the local communities. Our College of Natural Sciences has embarked on research on the herbs and the quality of water at Ikeji-Arakeji. We are embarking on 'active community participation', such that the communities feel a direct benefit of our presence as a University, not just as tenants in the houses of individuals.

The University needs to be reinvented to bring to bear its relevance by direct involvement with local communities. This calls for a more complex evaluation, but one which might give a richer picture of the dynamics between Universities and their local communities, particularly, at such a time in which many are striving to operate in a global education market place which brings its own impact considerations. We must recognize the permeability of the University under a traditional 'town and gown' relationship to include orientating degree programmes towards vocations and building strong links with the schools, hospitals and associations in the local communities.

4. **Training of Scientists and Technologists**

- i. Training of First Degree Holders. First and foremost, we must train a large enough pool of high quality, accredited scientists, technologists and

engineers because they are needed to create good jobs in the country. They are to attract and be involved in foreign direct investment, multinational corporation operations, offshore outsourcing from developed countries, and entrepreneurial startups. It must be recognized that there will be some leakages of these graduates to jobs in developed countries but many will still choose to stay in the country because family ties and culture will provide a comfortable environment. Take for example India and South Korea. In 1970 South Korea had about 6000 science-based graduates; in 1980, these were increased to 14,000. By 1990, the figure had jumped to about 80,000. These were properly trained graduates who had access to appropriate equipment. When plotted against South Korea's per capita Gross National Product (GNP) growth, the number of science-based graduates almost directly parallels the growth of the South Korean economy, offset by a few years. These data appear to show a direct cause and effect: investment in building a well qualified and sufficiently large pool of scientists and engineers leads to sustainable economic development.

The growing number of technically proficient and well-developed specialists also has enabled India to become a prime location for the outsourcing of technical support by the world's leading technology firms

In China, already a major economic power, the proportion of first degree holders in science and engineering to all bachelors equivalent degrees was 59%. This leaves 41% to all other non-science bachelor's degrees. This puts emphasis on the fact that we should maintain the ratio of 60:40

of science to other students in our admission exercises. As long as the ratio tilts in favour of non-science based students' our much sought after economic development will remain a mirage!

- ii. Training of University staff: This is different from exchange programme. This programme includes specialized and sometimes relatively basic techniques in developed laboratories abroad. Such trainings require no more than a few months duration, but are not available in developing countries like Nigeria. It can make a great deal of difference in terms of professional satisfaction of the staff, improved health care for the population and saved revenue. I suggest that we invest in several short-term and need-determined trainings with foreign organizations (Universities, Multinational Companies, Hospitals, etc.). Such need-directed training to fill basic needs could significantly transform the technical strength of home institutions and organizations. "Excellence in higher education (science and engineering) helps a country to be technologically innovative and economically competitive".

5. **Entrepreneurship**

Our science and technology should include significant coverage of entrepreneurship – how to start, operate and grow a small business. US companies such as Hewlett – Packard, Microsoft, and Yahoo, all were started in garages by enterprising young people with a technical bent.

Science, Technology and Engineering students should be equipped to be able to create jobs rather than to seek one.

Right from inception Joseph Ayo Babalola University included entrepreneurship in its academic programme and entrenched entrepreneurship as a course in which students who do not major in the programme must take a mandatory 12 credit units before graduation. The University has thus kept faith with the dreams of its founding fathers in the provision of qualitative University education aimed at positioning its products for the world of work as job creators and not job seekers. I wish to congratulate the University for its Vision in taking this bold step.

6. **Diaspora**

Previous emigrants must return from the Diaspora. Africa loses 20,000 professionals on a yearly basis. Africa's share of global scientific output has fallen from 0.5% in the mid 1980s to 0.3% in the mid 1990s. The continuous outflow of skilled labour contributes to a widening gap in science and technology between Africa and other continents. Emigration of our professionals to the West is one of the greatest obstacles to our development.

Nigerians in Diaspora are estimated at between 17-20 million, a significant fraction of these are professionals. There are about 5000 Nigerian medical doctors practising in North America. However, it appears that we are less

enthusiastic in receiving technical and skilled help from those of ours holding professional positions abroad. Granted, some of these people have strong opinions based on their personal experiences of how things do not work in Nigeria. However, an initiative that attempts to solicit the personal help of these individuals or that of their organizations could foster strong collaborative links in crucial areas such as research collaboration in medicine, technology, Engineering and profitable business ventures, necessary for lifting the country into a higher position. This would require a change in attitude toward those who left. Perhaps the concept of brain drain could be replaced with one of brains 'in foreign reserve' locked abroad. It is up to those at home to unlock this strong asset and all the benefits they can bring to the people. Those who left should be viewed as assets to the homeland. That is what the Chinese did, and see where they are today!

7. **Retaining Talents**

We must imbibe the culture of retaining staff. Sadly, lack of retaining culture is one of the main drawbacks for sustainable development of the technical and academic base of Nigeria. It is estimated that about 20,000 Nigerian academics are now employed in the United States alone. It is common knowledge that any talented skilled person who chooses to stay in Nigeria either has compelling reasons to stay or is working hard to

leave. The developed countries of US, Australia, Canada, United kingdom and the European Union Zone have put in place point-based systems that encourage skilled professionals from anywhere in the world to settle in these places.

Secondly, the availability of both high-quality education and opportunities in research are the keys to retaining and attracting talents. The steps taken by China towards becoming a leader in biological research and biotechnology illustrate the empowerment. The scientific leadership positioned China to become the only developing country participating in the Human Genome Project. Experience gained through the participation of its institutions in the Human Genome Project provided the platform for developing biotechnology that can be applied to human diseases and agriculture. The opportunities generated by the Chinese in biotechnology attracted international collaboration in joint ventures and gifted Chinese are retained at home.

It would be necessary to create the right environment in Nigeria that encourages young talents to stay in the country. For instance, net migration of Nigerians in 2008 stood at -177,000 while that of Kenya was 25,000. Yet, the answer lies in why people leave in the first place: Insecurity and frustration and the inability to function due to the social and infrastructural difficulties here; and lack of motivation. However, that is an issue for the social economists to address.

8. **Exchange of Staff and Students with Developed Countries for Scientific and Technical Competence**

The international community of today is becoming increasingly interdependent politically, scientifically, economically, technically, culturally, socially and indeed in all aspects. Knowledge is being produced throughout the world, and active engagement with scholars in other countries is crucial for developing and maintaining a lively intellectual community. Much new knowledge is an international public good, and its benefits will extend well beyond the borders of the country in which it is created. Countries that allow information to flow freely will benefit more.

There are numerous stories of how an exchange programme opened up the eyes, changed the lives of or set off successful careers for people. We all know that to go to another country and study is something which can benefit us as individuals enormously. From a national point of view, student and researcher mobility is important as a means to build networks and attract talents from other countries. Look at what Chinese and Indian students and staff in the United States have done to fuel growth in their respective countries. Indian students who have studied and worked abroad are now returning in increasing numbers. This has resulted into heavy foreign direct investment on IT in India and China, and in the long run a mix of competition and cooperation benefited everyone.

Influx of foreign scientists and researchers will surely benefit a nation like Nigeria that is, still, developing and will reduce brain drain as it is being experienced in the third world today. International collaboration has not only benefited countries where a particular technology is domiciled but has greatly influenced and improved research the world over.

9. **Funding Research**

Nigeria does not yet possess the necessary elements to develop a national innovation system. The facts are not encouraging. Available data indicate low levels of investment in research capacity, and help to explain why the country's non-oil economy has remained consistently sluggish during a decade of international economic expansion. On the research side, Nigeria's number of scientific publications for 1995 was 711, significantly less than its output of 1,062 scientific publications in 1981 (Task Force, 2000). In contrast, scientific publications were 3,413 for South Africa, 14,883 for India, and 5,440 for Brazil (Task Force, 2000). The country's low research output probably reflects the low priority decision-makers accord research. For example, Nigeria's federal university system spends only 0.3% of its budget on research. To this the Government should react positively as scientists all over the world are evaluated in terms of the papers they publish, and publications will not just arise except a research has been carried out.

Table 6: Research for Development Spending (% of GDP)

Country	R&D (% of GDP)
South Africa	0.87
Nigeria	< 0.40
Sweden	3.98
Finland	3.48
USA	2.68
China	1.44
EU	3.00

Source: Organization for Economic Cooperation and Development (OECD), 2006

In Table 6, we can see that Nigeria spends less than 0.4 percent of its GDP on research and development. I am recommending that the government should plough about 2 percent of the nations GDP into Research and Development. Our research should be in the area of science and technology as well as in other areas that will be beneficial to all and sundry. Nigeria has crawled for too long. She must learn to walk.

10. **The People's Mindset**

To be a player in the global village that technology has forced on us, there is a need for change, from the present to the future, from the familiar to the unknown and from inertia to action. We need a paradigm shift.

We need to develop strategic plans for the eventuality that our oil reserves will be depleted, when we will have to rely on other technical products and services in order to continue to flourish in the global competitive economy. Corruption should be down played. It has been argued that financial mismanagement and lack of accountability by officials led to diverting substantial resources from the educational institutions to other ends. Some of the loans received from the World Bank toward education during the 1990s were used to purchase unnecessary, and "expensive equipment" that "could not be properly installed or maintained, and many institutions received irrelevant and useless books and journals" (*Bollag, 2002*). All these, including ubiquitous corruption, have contributed to the decline in the quality of instruction in Nigeria's educational institutions that were ones highly regarded.

It is interesting to note that countries such as India, Pakistan, Brazil and even China were as incompetent in Science and technology a few decades ago as Nigeria is today. However, they have moved on since into positions of global respect as far as technical advancement is concerned. The key factor is personal discipline and collective commitment on the part of the people. Sadly, these key moral ingredients have not been the strongest assets of Nigerians in recent times. How to achieve that is not entirely clear. One thing is certain though, without these key human factors nothing will work.

Students must learn not only what is known now, but also how to keep their knowledge up to date. New technology-based tools for gathering knowledge must become central elements of their education, and curricula should be designed so that students learn how to learn.

SUMMARY AND CONCLUSION

In this lecture, I have tried to explain that in the current global atmosphere, there is an urgent need to get Nigeria onto the path of technical and scientific competence. Also, I have itemized the parameters that are necessary in order to achieve this lofty goal. Achieving this goal of course, would involve significant investment in people and resources, as well as fundamental changes in attitude on the part of the establishment. Consequently, I was able to make several suggestions that can assist us to become globally competent in science and technology. In this respect, the expected roles of stakeholders (the Government and other University Proprietors, the University and Organised Private Sectors) were articulated. I have also pointed out that a key factor in achieving our goal is personal discipline and collective commitment on the part of the people.

Quality education delivery remains Nigeria's hope of reducing the high level of poverty in the society as well as becoming competitive in today's knowledge-driven globalized economy. In spite of the fact that Nigeria's education system has come far and made the nation what it is today, the increasing challenges of the twenty-first century demand that we reengineer our education system to make it more responsive to national goals and aspirations as well as global demands.

Finally, we as Christians should understand globalization as the linking of the people of the world together in a kind of a global village where we will become very much interconnected both in fulfillment of our needs as well as sharing of

the world's resources. Globalization should therefore be seen as one of the many things in the scriptures where God is seeking to bring all nations together in Christ through the enabling presence of the Holy Spirit.

I wish to sincerely thank the Proprietors of Joseph Ayo Babalola University, headed by Pastor E.H.L. Olushey, the Chairman Board of Trustees and President of the Christ Apostolic Church Worldwide for the huge sum of money being spent on infrastructure and laboratory facilities and the premium placed on excellence. Our University, my University, and your University will by the grace of the Almighty God be among the best world Universities in not distant a date.

I thank you all for your kind attention.

Prof. A.A. Odutuga
21st May, 2009

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