

The Roadmap to Africa's Technology Revolution

0. Introduction

You know it is difficult to convince a lot of Nigerians that Nigeria is a poor country. Most of us believe that Nigeria is rich and the only problem is the misuse of the wealth. While I agree that we have the resources that can make us into a rich country, I must however say that there is a difference between having a potential and actual wealth.

Of course we have a large GDP - the second largest in Africa. But our GDP is small compared to our population. Hong Kong is a city smaller than Lagos but their GDP is on par with the entire country of Nigeria. And of course we have misused our oil wealth. We have failed to invest in infrastructure. Prove? Egypt. Egypt's GDP is roughly the same as that of Nigeria, but you cannot compare the infrastructure in cities like Cairo and Alexandria with any place in Nigeria.

Proof that we are a poor country:

1. The richest man in Nigeria is not as rich as one 26 year old guy in America. I am talking about Mark Zuckerberg the founder of Facebook. It is not possible to be as rich as Bill Gates in a country where the GDP is only about 200 billion dollars. Unless if Nigeria is a kingdom and you are the king!

2. Absence of Mega projects.

Our gross domestic product of 200 billion dollars implies that each Nigerian is producing, saving/investing and spending about 16000 naira per month. Of course this is not shared equally. Some have access to billions while others are getting hundreds of naira or nothing. So if your approach to riches is to get a bigger slice of the national cake, then you getting rich will definitely lead to more poverty.

But there is another way: Making the cake larger, by creating wealth through production. We will reduce our dependence on imports and we will even have excess to export. This will lead to job creation and an increase in investment and economic growth. You will become rich and at the same time you will be helping to eliminate poverty.

We need to grow our economy to half a trillion dollar economy (equivalent to 45000 naira output per citizen per month). This would have more than achieved the vision 2020 plan to make Nigeria among the top 20 economies of the world. According to our roadmap, this will happen by 2025.

Lofty dreams and visions are nothing new in Nigeria. We had similar promises in the past: Education for all by the year 200; Vision 2010; Vision 20 2020. We are very good at shifting the goal post when the target is approaching. So why should Nigerians bother with the roadmap when all previous attempts were only monumental failures that failed to leave behind any major impact?

The roadmap is different. It is not a promise. It is not even a plan. It is a resolution and a commitment. Similar to when JFK made a commitment to put a man on the moon within a decade. It is a challenge we have given ourselves as citizens, engineers, academics, and entrepreneurs. That it is possible for a Black nation to be one of the most developed countries in the world. And that we can achieve this in a few years. We are sure that it is possible, but the only question is how? Sincerely we have no detailed answer. We only have two things: the

roadmap which is a map to our destination with signposts along the way to reassure us that we are on the right track. The second is the scientific method. We shall employ the scientific method to discover how to move from one milestone to the next until we get to our destination. So we are going to experiment a lot. And we will keep an open mind - ready to discard any ideas that prove to be a failure in favor of anything that works.

Africa faces an uncertain future in a rapidly changing world. The world is at the threshold of rapidly accelerating technological development. The coming revolutions in biotechnology, robotics and artificial intelligence will render most of our current sources of wealth such as natural resources and even labor insignificant.

So why did we fail in the past?

Africa has always been an isolated part of the world. We have never faced any major military challenge from the outside world. So there was no real incentive to develop technologically. Most of the technologically advanced countries today owe their technology to their efforts to fight foreign domination or to dominate others. The parties to the two world wars emerged to be the big super powers. Even the vanquished; Japan and Germany are among the 4 largest economies today. Necessity indeed is the mother of invention. The space race was as a result of rivalry between the USA and the former USSR. The growth of Silicon Valley is one of the products of this competition. (DARPA was created in response to the Soviet launching of the Sputnik)

China has a very long history of fighting against foreign aggression. The great wall was built over a period of about 800 years to keep the Mongolians out.

And because we were not technologically developed and our warfare was primitive, it was not possible for rival kingdoms to dominate one another. So we ended up with relatively small kingdoms. As a result it was easy for the colonial masters to defeat us. And even after the end of colonization, there is little that holds us together as a country in terms of history, culture, and language. Unlike in Britain for example where the English dominated. Similarly the Han ethnicity is dominant in China.

The result is we have adopted foreign culture and unfortunately we have no sense of respect for that culture. So at the end we are a people with no respect for any culture. For example, most of us insist in teaching our children our mother tongues as their first language. But when the kid starts going to school, he is taught in English, a language he does not understand. This is why our children struggle with education. At secondary school they are still learning to read, while his mates in other parts of the world are already engaged in problem solving and creative thinking.

Why it will work this time:

Most of our previous developmental programs were planned from the top and based on models developed in the western world. It did not take local realities into consideration. For example, there is no merit in too much emphasis on intellectual property protection at a time when we are at a disadvantage. Our emphases right now should be on how to disseminate knowledge even it means we trample on intellectual property of other countries at times. Also some western business model that places a lot of value on design and development may not be workable at the beginning. For example, if a customer asked us to design a product for them we cannot charge him say 4 million naira for such an intangible thing as files in a computer. The model that can work in Africa is that of partnership, where the designer is entitled to royalties.

Our approach is grass roots oriented. We will provide knowledge to the masses and show them how they can use knowledge to generate wealth. Our program will use the scientific method and control theory to socially engineer a change. We will use positive feedback to create a runaway growth in the economy. We will discuss this in details later when we present the signposts of the roadmap.

1. Microscale Embedded

The ultimate goal of Microscale is to use technology to address the problem of poverty in Africa. Africa's poverty is due mainly to the limited level of skills and usable knowledge among its population. Most goods and services consumed in Africa is either produced outside of Africa or requires the presence of foreign expatriates to produce.

Africa's raw materials alone are no longer enough to solve its myriads of problems. Today's economy is often referred to as a knowledge driven economy. And rich countries are no longer those that have natural resources, but those who possess the know-how and expertise to manage information and use knowledge to produce innovative products and services.

Information technology is the backbone of the knowledge economy. It runs the computers and the networks that enable people create and process information and collaborate with one another. Embedded computers give intelligence to our factories and they form the nucleus of our gadgets like phones, mp3 players and cameras. They can be found in even traditional home appliances like the TV and washing machine.

Therefore if Africa is going to solve the problem of poverty, it must master Information Technology not just as a user or consumer of its products but also as a producer.

The strategy of Microscale is two faceted. One, Microscale will be a model of how to start-up a small hi-tech business in Africa. The aim is to show the viability of hi-tech business in Africa. Secondly, Microscale will provide services that will enable other hi-tech companies to get started.

The goal is to have a critical mass of SMEs that will transform Africa's business environment into an ecosystem suitable for hi-tech manufacturing and to make it possible for Africans to participate in the 21st century global economy as a contributor.

Microscale's slogan is "sowing the seeds to Africa's Technology Revolution". And we hope to be the seed that germinates and gives rise to many trees that will become Africa's Microsoft, Intel, Apple and Google of tomorrow. Governments have a large role to play in this effort. But we believe, we as technologists, academics and entrepreneurs, we have to take the first steps. Let's sow the seeds first. Then we can call on the governments to help with the watering.

2. The signposts on the Roadmap

Signpost 1: the year 2011. Hi-tech products introduced

Microscale Embedded ltd introduces the first hi-tech products that are engineered by local workforce. The CDM event of 2011 introduces some of the products and opens the eyes of participants to the possibilities. What is new in Microscale's approach is the use of local talent at the design and engineering level of product development instead of the usual approach of merely

assembling in Nigeria while the design is done overseas. The Ovim tablet, which is jointly developed by Microscale and Fasmicro, is a good example of this.

The result is a rise in local talent and a plethora of innovative products that were inspired and developed locally.

A number of hi-tech businesses will be established and a semiconductor association of Nigeria formed. The availability of design and manufacturing services from Microscale will enable many graduating students to startup their businesses with minimal funds by relying on these services.

Signpost 2: 2012: Innovation springs from University students

An innovation award is introduced by Microscale in 2011. The award is given to the most innovative project presented by a graduating undergraduate in a Nigerian university. The main criteria for the award are its appeal to the Nigerian market as we will be looking at projects that can be converted into products to be sold in Nigeria.

There will also be a TV show dedicated to the competition in order to inspire others and to popularize innovative thinking among students. The result is a rise in the level of innovation from among Nigerian students. We will see many more startups from Nigerian students in 2012. The percentage of skilled/employable Graduates increases and more Graduates will opt to become self-employed or run their own businesses.

Signpost 3: 2013-2015:Hi-tech businesses boom

Thousands of small business already established. And companies begin to specialize. Some in design others in manufacturing while others supply and distribute components. Some in hardware while others in software (firmware & RTOS) development. The hi-tech industry increasingly becomes a major employer of labor. Governments start to recognize the rising importance of the sector. Some state government start to introduce incentives to attract some of the startups.

Signpost 4:2016-18: Factories come

Thus far, most of the hi-tech companies, have concentrated on design and assembly, while the bulk of the manufacturing is done overseas. This is due to the high Capital requirement for building and running factories and the fact that their production volume is relatively low and building factories thus far doesn't make economic sense. However with the rising number of local products in the market, business men and industrialists will start to see the opportunity in having some of the manufacturing facilities locally.

The first factories will be specialized and they will concentrate on the process. They will take jobs on contract from the multitude of products designers. A couple of big factories that services the thousands of product makers make a better economy of scale than each product maker having his own factory.

The factories will include PCB (printed circuit board) manufacturers, PCBA (PCB assembly), and enclosures (both plastic and metallic).

Signpost 5: 2019-2020: Hi-Tech Clusters

The undeniable impact of the hi-tech industry on the economy is recognized by the government. They like the number of employment generated, both skilled and non-skilled; the higher quality of life because of lower cost goods; the savings from foreign exchange as a result of local production; and taxes generated from the rising number of manufacturers.

In order to multiply the benefits, Governments at all levels will start massive investment in infrastructure in order to stimulate more growth. Hi-tech industry clusters will arise across the country, each cluster specializing in different areas of technology.

Government will also make favorable policies such as requiring companies in the communications, power and other sectors to invest a percentage of their profit in research and development.

Signpost 6: 2020-2025: Exponential rise in GDP

National GPP rises exponentially as a result of technology market explosion and the indirect effect of hi-tech on other sectors of the economy. Some of the early pioneers of the Industry are now Industry giants and they are joined by global tech leaders who are falling over themselves in a scramble for the available high skilled workforce and to take advantage of the favorable business environment.

Government introduces a high skilled migrant program in order to cope with the rising demand for experienced corporate management and engineering workforce.

3. How to position yourself to gain

Students and graduates

Students can participate in our innovation award. Winning projects will be commercialized and the student will be entitled to royalties. Students and graduates can also participate in training programs such as those offered by Microscale and other technology companies. Those already skilled can come and work for us or any of our partners. They can also provide their services as freelancers.

We see a lot of students founding their own businesses. These will join us in growing and developing the sector by specializing so that we can rely on one another for products and services.

Businesses

Established Businesses can have their products developed locally by using the services of local technology companies such as Microscale. The advantage they will gain is products that are designed to meet local functional and performance requirements and that are competitive in price and responsive to changing market conditions.

Investors

Inventors can put their money in some of the well managed technology companies. They can either invest in the companies or in products by using partnerships or joint ventures. Given the high rate of growth we foresee in this sector, hi-tech will be one of the best places to invest in the coming years.

Government agencies

Agencies under the Ministry of science and technology especially can partner with the technology companies to help them realize their mandates. The companies should be invited to participate in technology transfer programs and any bilateral relationships with other countries

that involve technology. The private sector can help to domesticate technology and the Agencies can leverage the efficiencies offered by the private sector to their advantage.

The ability of Agencies to partner with local companies and thereby deliver on their mandates and impact the economy will help them make a case for higher budgetary allocation from the Federal Government.

State governments

State Governments have a lot to gain in attracting technology to their states; gains in employment generation and taxes. Governments can become competitive by investing in infrastructure and setting up technology parks. Timing is very important here because governments who invest too early in technology parks before there are enough companies to run it will only be wasting resources. Good example of this kind of failure is Tinapa and also the various free trade zones across the country.

Governments should also not be looking for immediate returns. They should have their eyes on the medium and long term.

Universities

Universities that are able to prepare students to lead and/or take part in the technology revolution will have a lot to gain. They can position themselves early on by partnering with the early leaders such as Microscale and Fasmicro. Both of these companies already have a variety of programs (some are free) designed for Universities as they recognize the important role of educational institutions.

Universities can also commercialize some of their research findings by developing products and services. They can encourage their students to be entrepreneurs by creating the enabling environment within the campuses. If they play their cards well, Universities can serve as the heart of hi-tech industry parks.

As the quality of education rises, the cost of University education will rise accordingly. With the increase in industrialization (and therefore employment opportunities for secondary school graduates) and the higher cost of university education, the era of going to school just to obtain paper qualification will be over. Only schools that are highly rated will be able to attract talented students and funding.

Federal government

Federal Government money can help accelerate development. But Government is more effective by introducing better regulations and passing laws that encourage the development of local technology companies. Local companies should be involved whenever the Government embarks on major projects. By involving local companies in large projects carried out by foreign ones, the local companies will be exposed to the technology and they can help to domesticate it. Less than 5 years ago the Chinese were buying high-speed trains from the Germans and Japanese. Today China is the world leader in the high-speed train industry. Even the governor of California was in China last year to discuss the possibility of buying trains from China.

Government should make it a policy that all Government contracts be awarded to local companies with proven capacity to deliver. In the absence of this, foreign companies can be invited with the local ones attached so as to learn from them. Local companies must be those with a structure on the ground and the capacity to learn and develop further.

Government should also invest in the population by providing free, compulsory and qualitative education to all Children up to junior secondary level. It must declare a target of 100% literacy level for all Children born from the 1st of January 2015. The use of English language for pre-primary school children should be encouraged. Since English is the language of study in our schools, our target should be that all pupils at entry level must be able to speak and understand English. This will help prepare a generation of educated workforce for the coming industrialization.

Free tuition at universities should be abolished. Students paying for education will help improve the quality. And entry into university should be based on merit or your ability to pay the fees. Scholarships and student loans should be made available to bright students. For those who cannot make it to university, they will still be better educated than some of our current half-baked graduates because of the higher quality of primary and secondary schools. And they will have the option of getting jobs that pay better than what current graduates earn. They can also go to technical schools to learn a trade and go into business.

Companies in major industries such as Oil, Telecoms and Power will be required to invest a percentage of their profit in research. This will help keep our professors and their students busy. It will also help in funding research institutes whose output will go back to develop the industry. The Federal Government should identify the emerging technology clusters and select one for special attention. Federal resources will be used to develop the special region similar to the Chinese experiment in Shenzhen. When successful, the strategy can be replicated in other regions.

Other reforms that will be necessary include legal system. The rule of Law needs to be strengthened and dispensation of justice made faster. This will help in enforcement of contracts between businesses and in handling disputes and fraud.

4. Conclusion

So that is our agenda for getting us out of poverty. We believe you cannot be truly rich when your country is poor. Because however much money you have you will still have to suffer noisy generators, darkness in your neighborhood or when you have to travel at night, insecurity, bad roads, poor healthcare facilities. You might even die of a mysterious African disease called “brief illness”!

The solution to poverty is knowledge and we must empower all our citizens with knowledge. Knowledge that will make them productive and help them cope with the challenges of the 21st Century.

Technology is wide and extensive, and even the simplest of hi-tech products requires thousands of experts and millions of workers. No single entity can accomplish this revolution on its own hence the call for cooperation among all the various sectors.

The path to this revolution will be interesting on its own and we should not be in a hurry to get to the finish line prematurely.