

## **AFRICA AND THE EMERGENCE OF ROBOTICS**

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## **Introduction**

Technology like robotics in countries termed to be underdeveloped is a welcome development. This will make the citizens of such countries sit up being that even basic technology is lacking in their nations.

Africa Is a developing continent in all respects and technology is just being introduced into various countries, while some are already used to technology in their midst, an advanced kind of technology like Robotics when introduced at the stage where some African countries are still battling stable electricity will be mind blowing because even in developed countries, robotics is still in its early stages of practical application in the lives of man.

## **The evolution of industrialization**

Underdeveloped countries have so many problems that technology can be used to solve. It is amazing that while industrialization began in some developed nation as far back as the 18th century, some countries in Africa are yet to experience industrialization. Industrialization is normally the birth of modernization and civilization in any country. Before the advent of industrialization, most countries were living on a subsistence level, where most of their citizens were farmers living in poor colonies. But post- industrialization brought about rapid growth, wealth and economic empowerment for the countries involved. industrialization is closely linked with technology and machines because according to Encyclopædia Britannica industrialization in modern history, is the process of change from an agrarian, handicraft economy to one dominated by industry and machine manufacture(1) and another definition says, , industry refers to the production of goods, especially when that production is accomplished with machines. It is this limited definition of industry that is embodied by the notion of industrialization: the transition to an economy based on the large-scale, machine-assisted production of goods by a concentrated, usually urban, population of workers. Manufacturing, which literally means "making by hand", has come to describe mechanical

production in factories, mills, and other industrial plants.(2).

Machines gave rise to high level of productivity which meant greater income for the country and translated to overall economic growth.

## **State of Technological Development in Africa**

There is a deception in the African continent about the state of development this is because even though locally we haven't achieved industrialization we have a semblance of technology all over the continent, the reason is that we have lots of foreign industries bringing in technology, most of them as finished products so we find that we have some of the latest cars, phones and gadgets amongst us but we are still not termed to be advanced because We don't produce them. Industrialization especially in Science and technology always require that the technology in question is produced in that nation. So when I say the emergence of robotics in the continent of Africa, I don't mean flooding the market with robotic devices because its not that this robotic devices do not exist in the African continent but its only bought by a few rich in the country just to add to what they own, not to study or do research with it. This is why even though 3.5 and 3G TV technologies and satellite decoders exist in Nigeria; it can never be termed to be advanced. One of the major reasons for the success of the Chinese is that when they engaged in importation, they ensured that they imported technology and knowledge instead of finished goods. They concentrated on the need to improve existing facilities, renovate factories through selective purchase of key technologies rather than purchase of whole plants (3)

They understood what most Africans haven't understood yet that it is only countries in which technology is produced that will be acknowledged as produced, not the countries in which finished products is exported to, so no matter how much already finished products and technological devices is exported to Africa, it will never be listed as one of

the most advanced continent in technology because we do not produce it.

## Reasons for Underdevelopment

According to Prof. Dr. Eng. Venancio Massingue on the reasons why Africa is failing:

- The Africans are concerned to catch up the Europeans and the Americans in their development on ICT. Weak strategies to develop ICT products and services that interest Africans and others continents.
- Most academies became repetitive and less innovative. Weak strategies to develop teaching and learning techniques based on applied research to solve practical problems, to create in the student the spirit of innovation and entrepreneurship.
- African governments have a lot of priorities and challenges (eradication of poverty, endemic diseases). Less space to join the academies and researchers in their effort to become active actors in ICT and embark in policies that create environment for ICT Industrialization.
- Most of African entrepreneurs act as surviving-entrepreneurs. Weak strategy for becoming active generator of wealth.

These are true but in one word like he mentioned later, the problems Africa is facing is Human Capital Development.

According to all the reports from industrialization in developed and developing countries like China, Successes have been mostly accredited to human Capital (5), and countries like Iran have made considerable advances through focusing on education and training(6). Training, Education, Skill, Developing Human Capital, Knowledge, Exposure have all been the major points in industrialization.

Other factors like Cultural factors, Political Stability and wealth (7) are also problems but in Africa, Corruption is one of the most prevalent factors because most times even when resources are available, they are diverted by officials involved, for selfish reasons.

## Robotics

Technology is brought, Robotics in particular that

like I mentioned earlier can be used to solve majority of problems in Africa. What every country needs for advancement and to solve majority of her problems is Industrialization and with industrialization come machines and machines mean increased productivity and output, being that what 6-10 men would have done in a long period of time, a machine will do in seconds. This means efficient, more accurate, timely, mass production of goods large enough to be exported which automatically translates into wealth, advancement and economic growth for the nation.

Robots fit perfectly into the definition of Industrialization. From Wikipedia, A robot is an electromechanical or biomechanical device or group of devices that can perform autonomous or programmed task. The computing Dictionary defines it as a mechanical device for performing a task which might otherwise be done by humans e.g spraying paints on cars(9).

With this in mind we can see from the earlier definition of industrialization that robots fit the description of the industrialization process. In the 18th century, British textiles manufacture was based on wool, flax and cotton which was processed by individual artisan with little output, but the introduction of machinery the incremental advances of the spinning wheel and hand loom led to increased productivity to the extent that manufactured cotton goods became the dominant British exports by early decades of the 19th century, taking the place of India as premier supplier of cotton goods.

If the machines of the 18th and 19th century could boost productivity to the extent that a nation can become a premier in the production of goods, think what an advanced technology can do for a continent like Africa, with all its rich natural resources. It will automatically catapult Africa to a developed nation in a number of years. Africa lacks technology because she lacks machinery or process technology to make her more productive. Nigeria for example produces crude oil but due to lack of process technology, she doesn't drill her oil, neither does she refine her oil, so she has to rely on other countries to refine her oil and sell it back to her at ridiculous prices. How different it would be if she could own her refinery, process her oil and export to other nations. This is one of the major problems facing Africa

## **Effects of Robotics**

Robots are autonomous in operation therefore unlike machines of the old and even now do not need to be controlled by man i.e during operations, therefore advanced job opportunities like, strategizing and planning operations, building, designing, programming and manufacturing and selling parts and components of the robots and the other technology used in building them, packaging, transporting and supervising robotic activities, are just a few of the advanced, mental, high collar jobs that will emerge as a result of the emergence of robotics in Africa. Africans will no longer need to be subject to some forms of indemnifying labor which lack of machineries has forced them into, and start to use their minds more because it is well-known that those that use their minds to work are more advanced, earn much more and are in higher demand than those who exert physical strength to work i.e managers in offices, just sitting down and strategizing earn more than casual workers who lift stuff and exert strength all day. Simply put, smart work vs. hard work. Africa is still at the level where most of her citizens exert strength in most industry; this is the result of the low level of productivity in most sectors and the poverty amongst individual citizens of the continent, most of them low income earners. The truth is, the higher the level of productivity in industry, the higher the citizens earn and the higher the standard of living. Robotics can bring about that high standard of living.

Africans wouldn't need to go to farms with farm implements like hoes cutlasses toiling and producing little, instead that energy will be invested in building machines or robots that will perform such tasks.

In the universities, people are taught how to think, plan and strategize in their various fields, no one goes to the university to learn how to toil, which means that if every one were educated - and this is the goal of every nation then no one will need to toil, the way the uneducated who are normally employed as casual workers do. Education encourages the use of the mind more than physical strength. Think about robotics taking over agriculture in Africa while those simple farmers strategize how the robots will implement all the farming techniques they know.

This will automatically bring about the high productivity the farmers want and also transform them into wealthier people and their countries will then be termed to be highly advanced, productive and wealthy.

So advanced society normally is one where people think and use their minds more for work than strength. Societies with more thinkers tend to be more advanced than those with more laborers or “exerters” like I call them.

This is why some countries are termed developed because their human capital is developed with intelligence and analytical abilities instead of just being mindless laborers.

Industrialization using robotics can turn Africa from her mindless laboring to becoming intelligent professionals in every field. This is the secret to Advancement.

## **Tools for development of Africa**

Based on the reports on Industrialization, I have deduced 3 factors that when put in place, will turn any country into a technological power particularly in robotics.

1. Knowledge
2. Availability of Materials Locally
3. Research

## **Education/ Skill knowledge**

Training can be done in 2 ways. A number of Africans can go study in the US or other countries, this kind of Study abroad scheme can be done by the government or by individuals or private companies that are interested.

Exchange programs can also be carried out.

Alternatively, experts from foreign developed countries in the field can come over to train our people as in the case of the China/Soviet Exchange (10)

But particularly, I wish to discuss putting robotics in our educational curriculum/system at both the high school and university levels. At present it doesn't exist in majority if not all the schools in Africa.

The effect of this will aid our goal of advancement using robotics.

Research was conducted using the expectancy value theory; the impact of Robotic projects on girls toward science and Engineering (11). The Study showed how students' experience in a robotics educational program, affected their self perception of their abilities in STEM, science, technology, math and engineering and how it translates to career choices. This study was done on girls because prevalent in society is a traditional gender role belief which affect females even in this modern age. A few of this traditional gender belief are:

Girls should be more domestic

Girls should be relegated to less demanding, low level thinking and mind application tasks.

I dare to say that most Africans have similar belief systems, because of the state of underdevelopment and the history of bad leadership, stagnation and political instability in the continent. The research showed that after the KISS Institute Botball robotics program, the girls changed and increased their self perception and expectation of success in STEM which ultimately will affect their career choices and ability to succeed in STEM areas.

Therefore if program similar to the Botball robotic program are implemented in high schools in Africa, Imagine the kind of confidence boost that will happen in the lives of the students and the benefits for the nation eventually.

### **Specific Immediate solution**

I propose that programs like the KISS robotic educational program be introduced into the high school curriculum. The Robotic A.R.M team (12) is already carrying out a campaign on the importance of Robotics education in high schools in Nigeria through seminars, teaching, and workshops at high school science societies (jet club) using the robotic kit from KISS Institute Botball program as one of our practical tools for learning. This attracted one of the National dailies in Nigeria to make a publication for the first time on Robotics in Nigeria (13).

Partnership in this area will be a welcome development, where robotic materials will be giving to high schools at subsidized rates around the nation and eventually Africa. This students can then compete constructively and have a chance of

further boosting their confidence and increasing expectancy to succeed by entering for Botball 2009, school by school. If we start building up our children due to their engagement in this robotic curriculum, their abilities in these areas will increase and the country will benefit immensely from it and this will put any interested organization in the pages of history for birthing and fanning the flame of technological revolution in Africa.

Students that finish high school can go furthering Robotics by learning and working at the research center. The research center can then build a school, a dedicated school for Robotics and AI where students can learn.

### **Research**

Research must be linked to production. Basic research will also be carried out but most important and urgent, deliberate and applied research on practical problems, key issues facing the African continent, like food shortage (agriculture), electricity, housing , drainage (flooding) problems and other infrastructural problems, health care, education, science, oil drilling and refinement e.t.c. must be done first.

The major successes of the developed and developing nations came as a result of technology and knowledge (from countries gone ahead) transferred to them.

We are in dire need of such knowledge and technology in Africa, therefore foreign corporations are encouraged and challenged to partner with Africans in passing the needed knowledge for robotics to Africans. In this frame, I propose that an AI/Robotics research center be built in Africa, there is virtually none at present in Africa. Arrangement such as those done in China can be done to establish this research center(9) where both the Foreign and Chinese partners contributed what they had advantage in (technology and access to raw materials for the foreign partner and labor and c International companies will benefit intensely by this sort of arrangement because the solutions that such applied research will bring in the major sectors of a nation organized according to the Four Modernizations. If applied research is conducted to solve immediate problems (at first), i.e food scarcity, lack of electricity , infrastructural problems (refining oil and all the by-products of crude),oil exploration, Erosion and harnessing all our natural resources and discovering uses for them e.t.c,think of the enormous wealth that will be made, when industrialization through applied



research in robotics is used to tackle this issues, by both the corporation who partners to develop the research center and the continent. Wealth in terms of technological knowledge, advancement and development for the nation and huge profits for the corporation.

### **Sections of Research**

- Applied Research, Research into practical problems facing Africa
- Research into Alternative Cheap Robotic materials existing in Africa
- Basic Research
- Futuristic Research
- Research on how to improve sectors listed under the Four modernizations (Agriculture, Industry, National Defense, Science and Technology).
- Research into better educational robotic techniques
- Using Robotics/AI to modify existing technologies/devices/inventions.

One of the major problems in Africa is unemployment due to lack of skilled workers, lots of graduates seeking for jobs. Some of the people can be trained the international company to work in the research institute to use robotics technology to procure solution to the problems in the continent. Just one research center for a start, compartmentalized or broken down into different sections in a way as to address various pressing and basic issues in the country can change Africa FOREVER.

In Nigeria, the country I represent people who are passionate and concerned about the present state of underdevelopment in Africa and also passionate about using technology, particularly robotics to change these issues, exist, therefore I propose that this research center be built in Nigeria, Lagos State specifically. From there other sites will spring forth and we will then be solving the problems of Africa. The international company will be in the books of history as it is used to plunge Africa into its long awaited Industrial age.

### **Government Role**

- Funding of Research (Training, raw materials, professionals)
- Policies that favor technological development
- Engage in attracting foreign partnerships for Science and technology transfer

### **Conclusion**

In conclusion, if this things are implemented immediately Africa will have a chance of producing Technology, truly experiencing industrialization

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