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Africa's Journey to Industrialization

Chimezirim Young and Ayo Oyewale

Abstract

This chapter examines the history of other nations in achieving rapid industrialization, explains the scientific processes involved, as well as developing a model to guide Nigerians in curbing mass unemployment. This industrialized countries were selected randomly from the pool of industrialized nations, to represent the different continents. Their journey to industrialization was studied and itemized to help developing countries design a unique strategy to curb mass unemployment. The chapter adopts historical analysis to gather evidence and formulate ideas from the past and empirical analysis by direct and indirect observation. The data used in this study were both primary and secondary. The results of the study were descriptive in nature. The study revealed several models that would guide Nigerians to achieving industrialization. In conclusion, the principles and strategy applied by the industrialized nations for achieving industrialization and curbing mass unemployment is learning: theory and practical. Learning: proper education and training on how to manufacture products promotes industrialization, productivity and create job opportunities. The study emphasizes education and training as the principal learning tools for increasing employment in quantity and quality and promoting improved productivity.

Keywords: industrialization, productivity, learning, sustainable development, policies, science and technology, technological entrepreneurship, manpower development and innovation

1. Introduction

History is important, present decisions can be concluded based on yesterday's events. Just as a man values his memory, so the human race should value their history. Deductions from history enlighten the present mind, bringing about self awareness and historical exposure. History is indeed, "a roadmap that shows where you were from where you are and navigates you to the future". It is a wonder to note that many people and society plan without taking history into cognizance. Consequently, most men have been thinking and doing things as if the world began today. The flagrant disregard of history has led to man's inability to predetermine events and procedures, which makes man to continue to repeat his mistakes and suffer avoidable pains [1].

This book presents how Nigerians can start a journey towards industrialization; solve their myriads of problems, improve on its performance and save the failing nation from further collapse. It presents the experiences of other nations in promoting rapid industrialization; explains the scientific bases of the activities they carried

out, and describes how these other countries have used their experiences to achieve industrialization and enhance their performance. History is indeed, “a roadmap that shows where you were from where you are and navigates you to the future”. It is a wonder to note that many people and society plan without taking history into cognizance. Consequently, most men have been thinking and doing things as if the world began today. The flagrant disregard of history has led to man’s inability to predetermine events and procedures, which makes man to continue to repeat his mistakes and suffer avoidable pains [1].

2. Lessons from history

History shows that Britain and France spent 2000 years before achieving modern industrialization [2]. Here is an account of the positive changes which formed an intrinsic part of their evolutionary development voyage. Most pre-industrial European economies also had subsistence (as it is the case in Nigeria, today) standards of living among majority of the population. For example, in medieval Europe, a large percentage of the labor force was employed in subsistence agriculture. Increase in Poverty, Increase in population and escalated crime rates; during the reign of Henry VIII, approximately 72,000 people were executed for criminal offenses [3].

In the eighteenth and nineteenth centuries, massive increase in agricultural productivity due to the mechanization of agricultural processes was experienced by the United Kingdom, this experience was known as the British Agricultural Revolution. The British Agricultural Revolution enabled and freed up a significant percentage of the workforce from farming and helping to drive the Industrial Revolution. Increase in steel works and Demand for more machinery was increasing, job opportunities also began to increase [4]. The overwhelming efficiency of mechanized farming made the increased population not to be dedicated to agriculture. The process of production was divided into simple tasks, each one of them being gradually mechanized in order to boost productivity and thus increase income. The application of new technologies enabled the industrialization process to continue to evolve. Industrialization is the replacement of hand tools by machine and powered tools by a society. Industrialization also involves vast economic and social changes, e.g., a tendency towards urbanization, a growing body of wage earners, increased technical and advanced education [5].

In 1938, a ship-building yard was established and engineering works began. In 1939 the corset iron company started a steelworks. France, Germany, Sweden and other European nations had similar experiences and Britain had a single digit unemployment rate of 4.0% (tradingeconomics.com) and the ability of their economy to absorb labor increased [6].

In Singapore’s case the most feasible solution to their low economic development and high unemployment rate was to embark on a bold and comprehensive program of industrialization. Labor-intensive industries were a prime target. However, industrialization was a relatively new experience to Singapore because they had no industrial tradition. Both capital and entrepreneurship had historically been active in trading and commercial activities. The working population in Singapore focused mainly in trade, processing and service activities [7].

The Economic Development Board (EDB) of Singapore invested in manpower development, being an investment promotion agency? They work with other relevant government agencies, skills and technologies. In 1971, an Overseas Training Program for Singapore workforce was established by the EDB for training in industrialized countries and subsequently, technology and design training

institutions in Singapore and other foreign countries. Additionally, to encourage the right kind of manpower training, the EDB administers the Skills Development Fund and promotes the opportunity for the trained to apply the acquired knowledge and this paid off, because they currently have an unemployment rate of 2.20%.

The need to develop a highly learned and versatile workforce is very important, and Singapore has been preparing its human capital by developing a wide pool of skilled knowledge workers. The outcome of all these developments is rapid economic growth and full employment.

Singapore emphasized the increase on R&D and the installation of high technology based industries, this restructured industries [8]. This brings about product diversification which is crucial in enhancing sustained export performance and growth. There are two engines of economic growth identified in the restructuring process in Singapore: manufacturing and services.

Studying the case of America, Colonies gained independence in 1783 just as industrial productions and coordination's were beginning to shift production from handmade to machine made. The Industrial Revolution (1820–1870) was significant to the economic development of the United States. The Industrial Revolution itself refers to a change from hand and home production to machine and factory production.

People in the Pacific Northwest practiced food preservation although substantial agriculture, built wooden houses, used nets and weirs to catch fish, and was not developed [9]. Throughout the colonies, people were self-sufficient, they lived primarily on small farms and in the few small cities and among the larger plantations, some necessities and virtually all luxuries were imported in return for tobacco, rice, and indigo exports [10].

A unique confluence of geographical, social, and economic factors facilitated American industrialization. The passage of the Embargo Act of 1807 and the War of 1812 was the real impetus for America entering the Industrial Revolution. The British opened fire when they were not allowed to search the Chesapeake ship and this made Americans upset. The desertion caused from seizing four men and hanging one of them resulted in much public outrage and the passage of the Embargo Act which stopped the export of American goods and effectively ended the import of goods from other nations. Eventually, the war with Great Britain in 1812 made it apparent that America needed a better transportation system and more economic independence. The manufacturing industry began to expand and employment began to boom [11]. This gave rise to increase in productivity and ability of the nation to absorb labor.

Small local industries such as sawmills and gristmills emerged as the colonies grew and standard of living generally increased [12]. However, the people involved were small in number which in turn slowed down their rate of technological change and advancement [9]. To check this, everybody including children worked in large numbers in mines, glass factories, textiles, agriculture, canneries, home industries, and as newsboys, messengers, bootblacks, and peddlers. The industrial processes were able to keep the unemployment rate to 3.70%.

2.1 Sustainable industrialization and development

Sustainable Economic Growth, Industrialization and Development (SEGID) are achieved through learning. The value of the “learning-man” appreciates in a compound fashion with learning intensity and time [12]. So what does learning involve? Stahl [13] observed that learning begins from the novices' position and progresses to the experts' position. This in turn creates relatively permanent changes in

knowledge, skills and other behaviors [14]. Thus, when a person commences an educational or apprenticeship program, he or she usually begins from the minimum level. At the end of the first year of learning, the learning-person is promoted to the second level having learnt the things scheduled for the first level. The growth achieved this way is sustainable [15]. The learning person builds up capabilities or competence i.e. **the ability to do things**. The ability to do things increases with learning. The build-up of competence continues as long as the learning person continues to learn. Hence, performance enhancement is continuous, sustainable and effective.

If this is what learning involves, what then is the benefit of learning? Drucker [16] said that only man is capable of enlargement, because man grows, develops and acquires skills, and individuals can learn a specific type of knowledge, and the amount they learn is cumulative [17]. Learning and acquiring knowledge, skills, and capabilities and applying these in solving problems, including production, are the basis for achieving sustainable economic growth and industrialization [18].

Education and training are both essential arms of the learning process. But then, Ehiamezor [19] suggests that a clear path between education and training is very important for successful manpower planning. Formal education emphasizes on the acquisition of theoretical knowledge and the development of basic mental capabilities and general knowledge. Education, according to Coombs [20], is institutionalized instructions or course of study designed to make the learning persons, or student, experience the type of curriculum that is capable of providing essential learning needs. Education equips the individual with the ability to think and reason. Nyerere [21] considered education to be an instrument for effecting economic and technological change, change in ideas and personality. The essence of education is in developing critical thinkers and enhancing performance.

Coombs [20], however, defines training as a scheme designed to generate expertise or skills needed to perform a particular job or series of jobs. Kanawaty [22] observed that training prepares people for work and life-skills are largely developed in a working situation; competence develops through improvements of awareness, knowledge and skills. These work skills are of three types: technical, interpersonal or human and conceptual skills [23]. These skills are obtained through learning. That is, from “learning-by-doing” and “learning-by-adapting” to “learning-by-design” and “learning-by-improved design” and then to “learning-by-setting-up a complete production system.” [24].

3. Science, technology policy and modeling

Policy is a guide to thinking and action [25]; policy guides every thought process and activity undertaken in a society. Therefore, Nigeria must carefully consider its science and technology policies to guide the way we think and act.

Policies will not be successful if they do not go through the formulation stage, the implementation stage and the evaluation stage [26]. Policies once formulated, tend to become doctrines and models; they direct and justify action for some time, hence they should not be entered flimsily.

The knowledge and understanding that the scientists have about the world is often represented in the form of models. This scientific method is basically one of creating, verifying, and modifying models of the world and the goal is to simplify and explain the complexity and confusion of the world. The applied scientists and technologists then use the models of science to predict and control the world.

4. Models for industrialization

Discussing the journey to industrialization requires an emphasis on the desire to achieve industrialization, the desire to improve work performance and the desire to acquire knowledge. These models represented in this chapter would have no effect if there is an absence of genuine desire.

Each model discussed in this chapter represents a policy statement for personal and economic development. The policy statements were adapted from developed countries and modeled for easy interpretation and understanding. Nations must realize that attaining industrialization transforms the economy from a dependent state to an independent one, even further more to an interdependent state. Hence, the importance of these models for personal growth, economic development, performance enhancement and industrialization cannot be over emphasized. Therefore, to grow into a dependent or interdependent state, an individual or country needs to improve their manufacturing and service performance.

Every developing nation must know why and what to do to achieve that development and also know how best to go about achieving such an endeavor. It is good to understand that real growth and development do not take place suddenly; the price must be paid over an extended period of time in order to reap the benefits for a long time.

The following models offer insights on the concept of industrialization and performance enhancement. There are models that guide developing nations on the path to industrialization and models that transform individuals to become active creators, learned and productive.

4.1 The creed (model 1)

Before a nation attempts to be industrialized, there must be proper groundwork: research. This means a nation must undergo proper planning and forecasting. However, before a nation can plan, they need to have a direction, a goal and a vision. That direction must be well stated. This model emphasizes the need for sustaining values, having a unifying language, goal, purpose or creed to form a seamless boundary to curb tribalism, individualism, terrorism, nepotism and religious segmentation. Invariably all Africans should resolve in their hearts saying, *"I promise to think and act in a way that has not been done before, but can be done now, and should be done immediately."*

Let the vision be in a form of multiyear development plans. These multiyear development plans can make the attainment of economic development easier and faster. They can form a positive norm in the hearts of the citizenry, improve their performance and gear them towards productivity.

This creed, when said often becomes the subconscious language of the citizens. The citizens become a group of people who through their oneness of mind and language are able to achieve whatever they planned to do.

This creed is a guide and mandate that everyone must uphold, and it is a language everyone must speak. By so doing, it promotes unity and oneness. At this point, everyone would understand that although they have diverse cultures and tongues, they are one through the attainment of this creed.

4.1.1 Productive citizens

A productive Citizen is one who has the ability to think and act respectively. In order to make productivity a lifestyle, citizens must be constantly thinking of new

ways and seeking the slightest opportunity to apply those new ideas. The mind is the best creative tool. What flows into the mind is definitely what is expected to flow out. The mind helps to create a thinking atmosphere for new ideas and provides the ability for application. Each thought creates a neuron, each neuron directly and indirectly formulates a policy.

The mind power is the first tool to promoting sustainable growth, development and industrialization. The potential to think and improve the world around us is directly dependent on the level of knowledge or exposure attained – conceptually, technically and human relations. The true measures of any society or any individual is not what it knows but what it does with what it knows.

We have been made to constantly think that foreigners are better than us. We have harnessed this thought so much, creating millions of neurons and automatically it seems the foreigners are truly better than us.

4.2 Sustainable industrialization initiators (model 2)

Observing the historical experiences of Europe, America, Singapore and other developed nations, five factors are noted as key contributors that promoted their performance and industrialization process;

1. Manpower Development,
2. Employment Creation
3. Increased Productivity
4. Inventions and Innovations
5. Increased Learning Rate

These factors as presented in **Figure 1** either grow or reduce the industrial core. It was observed that a nation which hopes to manufacture many products must develop the people to manufacture them. These people developed are referred to as the nation's workforce or manpower. Developing nation's especially African nations need to set up a framework for training university graduates in a curriculum-based scheme for 4 years, so as to acquire the skills to modernize and repackage their traditional activities and for studying, servicing, maintaining, duplicating, and eventually improving upon the things they import today.

Nigeria and other African nations need to encourage, support and give opportunities to science and engineering graduates to input the theories they acquire in universities into their artisan/craft activities like blacksmithing, wood-works, textiles/tailoring, construction works, and factory floor work settings and all other places where skill acquisition opportunities abound. This is how the countries can improve performance and produce youths that can develop independent thoughts to solutions about everyday problems. These youth shall evolve to become Industrialization Vanguard (IVs). Their Productivity increases as they develop manpower capability and are employed into productive activities. This in turn creates more room for employment through expansion, and as they continually involve themselves in productive activities, inventions/innovations sprout out and these inventions/innovations form the basis for new knowledge.

Industrialization is not about erecting structures, it is about developing competencies and improving performances for doing uncountable things.

It is about ensuring a large percentage of resource is geared towards manpower development, employment creation, increasing productivity, promoting inventions and innovations and increasing the learning rate of the citizens. Industrialization is an all-encompassing process, it equals productivity and development. Actualization can be attained when industrialization, development and productivity are growing exponentially. **Figure 2** explains the components of the industrial core.

Figure 1.
Sustainable industrialization initiators. Source: Author, 2012.

Figure 2.
Components of the industrial core. Source: Author, 2012.

4.2.1 The industrial core

The industrial core consists of simple parameters that must not be overlooked. **Figure 2** shows the components that make up the industrial core. The industrial core is made up of two layers: the INTERNAL CORE and the EXTERNAL CORE.

The internal core includes the primary, secondary and tertiary industries. The primary industry also known as the extractive industry deals with the extensive extraction of natural resources without provision for their renewal. The primary industry is key and fundamental for the effective existence of both the secondary and tertiary industries. The secondary industry is the manufacturing industry as it deals with the process of converting raw materials in components or parts with the use of machines, into finished goods that meet a customer's expectation or specifications. The tertiary industry which is also known as the service industry serves other industries. This basically refers to the intangible products that are important to the primary and secondary industries.

The external core constitutes the decisive environment such as the percentage utilization of libraries, educational centers, information technology centers, scientific research findings, cultural uniqueness of the citizens. The integration of all these into government policies go a long way to determine the kind of industries, level of industrialization, performances and growth prospects available. Below is a list of industries classified in their particular sector.

1. **PRIMARY INDUSTRY (EXTRACTIVE):** Agriculture, Mining, Forestry, Grazing, quarrying, Hunting and gathering.
2. **SECONDARY INDUSTRY (MANUFACTURING):** Metal works and Smelting, Automobile production, Textile production, Chemical Industries, Engineering Industries, Aerospace Manufacturing, Energy utilities, Construction industry, ship building, breweries and bottles.
3. **TERTIARY (SERVICES):** Retail and Wholesale, Transportation and Distribution, Entertainment (Movies, Television, Radio, Music theater, etc.), Restaurants, Tourism, Media, Insurance, Banking, Health care, Law.

Being ready for industrialization depends on the effectiveness of the components within the industrial core. An economy or an individual must first be familiar with the components within the industrial core before the industrialization process is initiated. That economy must clearly have a reason for industrialization and know how to go about it. This is the journey the nation needs to embark on to prepare for industrialization. This process is not a waste of time and this stage holds all the fundamental elements for development. The level of preparation determines the outcome that the nation hopes to achieve. At this phase policies are set, decision are made, objectives are outlined, plans are arrayed, resources are weighed based on availability and capacity of use, forecasts are determined and a focus is outlined. A country can only be ready for development when all these are sincerely and truthfully harnessed.

4.3 Three true measures of sustainable economic development (model 3)

From history we can deduce that there are three true measures of sustainable economic development and performance enhancement. They are: 1) the level of technological knowledge, 2) the level of industrialization and 3) the level of national productivity. As shown in **Figure 3**, these three true measures are intertwined.

Figure 3.
The three true measures of economic development. Source: Author, 2012.

An increase in the level of technological knowledge through learning spurs increased national productivity through employment of a workforce that possesses technical knowledge. In turn, more industries would be established to utilize the knowledge and productivity in order to meet demands and exportation. As this cycle continues, the economy experiences sustainable growth and development and industrialization sets in. Industrialization is the extensive organization of an economy for the purpose of manufacturing. It introduces a period of social and economic changes that transform or liberates a human group from an agrarian society into an industrial one.

Historically, industrialization processes involves the expansion of the secondary sector in an economy originally dominated by primary-sector activities. The lack of an industrial sector in a country can slow growth in the country's economy and power, so government often encourages or enforces industrialization. These series of activities should lead to increased productivity, increased manpower that possesses technical knowledge and a high industrial cluster in all sectors.

4.4 The manpower learning model (model 4)

Manpower is that portion of the population which has actual or potential capability to contribute to the production of goods and services. They make up the workforce of a nation. The Manpower Development Learning Model has three key components that help initiate an efficient and effective workforce, as shown in

Figure 4. These components are 1) education (the theoretical part of Learning), 2) Training (the Practical part of learning) and 3) Age (experience and Timing).

A workforce that possesses a high composition of theoretical, practical and experiential knowledge can catalyze and experience greater productivity, increase in technological application, high performances and generate innovations. Industrialization can only strive where such a workforce exists. For an economy to achieve sustainable development there must be an increase in the level of industrialization, an increase in the level of national productivity and an increase in the level of technical knowledge.

A nation’s workforce must therefore concentrate on increasing productivity and acquiring more technical knowledge through research and development to spur innovations. The process of acquiring such intellect is known as the Manpower Development process and the manpower learning model is a guide to effective acquisition of the knowledge. The three major components of the model, education, training, and age, are discussed below.

4.4.1 Education

The higher the university education completion rate, the higher the share of knowledge that intensive service industries receive. The Knowledge Intensive Service Industry provides consumers with knowledge – based services, mainly relying on high technology, expertise, information and experience. The service process includes knowledge production, knowledge dissemination and knowledge use. The knowledge Intensive Service Industry is supported mainly by science, engineering, technology and other industries. The education and skills of the labor force have been recognized to be the underpinnings of innovation.

Innovation is possible if there are people who can perform research that generates new ways of thinking and new knowledge, who can apply their knowledge and skills, and who can adapt to change. Therefore, the workforce must aim at attaining a high theoretical knowledge, especially science and engineering graduates. Simultaneously, s/he must receive complementary training and skills based on their age and educational attainment. A workforce should be encouraged to pursue a university degree, alongside complementary training/skills. Education helps to build the technical, interpersonal or human and conceptual skills of the workforce.

4.4.2 Training

Coombs [21] defines training as a scheme designed to generate expertise or skills needed to perform a particular job or series of jobs. Kanawaty [23] observed

Figure 4. Manpower learning model. Source: Author, 2012.

that the training that prepares people for work and life skills are largely developed in a working situation; competence develops through improvements of awareness, knowledge and skills.

Training skills range from soft skills, basic artisan skills to advanced technical skills. Training must be practical and must complement educational (theoretical) knowledge. Training begins when a child is born, with soft skills and goes through from basic artisan skills to advanced professional skills.

4.4.2.1 Soft skills

Soft skills build character; they help develop the character traits of a person and they help define their personality. Everyone needs soft skills to prepare them and maintain a healthy working attitude.

Soft skills can be learnt at any age, but the nature of these skills suggests that they are best learnt at a very young age because they are foundational. Soft skills build the competence and confidence of the labor force, giving room for more achievements.

Soft skills range from learning diverse languages, presentation skills, drawing skills, writing skills, reading skills, music skills, ethics and etiquettes, etc. These skills improve creativity. This skill will enable the workforce to create sustainable enterprises and visionary companies. Soft skills are critical for the foundational setting of the workforce. They can provide great energy and cohesion for the members of the workforce.

4.4.2.2 Basic artisan skills

An artisan is a craftsman, someone who does skilled work; making things with his hands, manually. The artisan skills range from woodland crafts, building crafts, field crafts, workshop crafts, textile crafts and domestic crafts.

a. Woodland crafts

This includes coppices, hurdle makers, rake makers, fork makers, besom makers, handle makers, hoop markers, ladder makers, crib makers, broaches and peg makers, clog sole cutters, charcoal burners, oak basket makers, stick and staff makers, field gate makers, willow basket makers, and net makers.

b. Building crafts

The builders include stone masons, plumbers, decorators, bridge builders, French polishers, and sign writers.

c. Farmers

This includes hedge layers, stile makers, well diggers, peat cutter, gardeners, horticulturists, tree surgeons, foresters, farmers, shepherds, shearers, bee keepers, millers, fishermen, orchardist, and veterinarians.

d. Workshop crafts

This includes chair makers, iron founders, black smiths, wheelwright, coopers, coppersmiths, tinsmiths, wood turners, coach builders, boat builders, boiler makers, boiler men, soap makers, gunsmiths,, clay pipe maker, and tool maker.

e. Textile crafts

This includes spinners, weavers, dryers, silk growers, tailors, seamstresses, milliners, hatter, lace makers, button makers, mat and rug makers, crochet workers, tatting and macramé workers, knitters, quilters, smock workers, embroiderers, leather workers, and felt makers.

f. Domestic crafts

Fish smokers, bacon curers, dish wash maker, insecticide makers, butter makers, cheese makers, brewers, cider makers, wine makers, distillers, herbalists, ice cream makers, bakers, barrister and coffee roasters, osteopaths, naturopaths, story tellers, teacher, naturalists, historians, jesters, actors, administrators, philosophers, laborers, poets, writers, midwives, publicans, booksellers, Liberians, movie makers, public speakers, etc.

4.4.2.3 *Advanced skills*

Advanced skills are necessary for the mechanization or automation of artisan skills and the production of other advanced products not possible by craftsmen alone. Advanced skills include qualitative analytical forecasting skills, military training, leadership skills, teamwork and management skills, policy formulation and advocacy skills, wafer fabrication, Integrated Circuit Design, biotech, making petrochemicals, fine chemicals, pharmaceutical, automotive machines and cybernetics, aerospace, computer aided design tools and other precision engineering components.

Advanced skills involve a lot of research and development and are important to bring about innovation. Innovation improves and increases productivity, spurring industrialization and economic development. An advanced skill is a must-have collection of activities for advanced level students. The advanced training of workers is carried out through individual and team training, both on-the-job and in a variety of short courses. Such training is offered by institutes for improving the skills of managerial personnel and specialists. Advanced training does not usually require taking time off from work.

Therefore an “expert manpower” is one who has attained proper education and had been trained to an advanced professional technological level; integrating both theory and practice to improving productivity and promoting industrialization.

4.4.2.4 *Human activity valuation*

Every human being requires the opportunity to listen, teach and apply what they have learnt to productivity. Most of them do not know when to perform each of these activities, hence the need for the guide as represented in **Table 1**.

Listening is associated with the acquisition of theoretical knowledge, Teaching is associated with mentorship, raising successors and transferring values to younger generations. Application is simply the acquisition and utilization of practical knowledge.

4.5 **Development flow chart (model 5)**

Studying developed nations resulted in designing the Development Flow Chart, as shown in **Figure 5**. Studying the models of developed countries on how they scaled through the process of industrialization, we can identify various stages that

Age	Listening	Teaching	Application	Total
0–5 years	85%	05%	10%	100%
6–19 years	55%	15%	30%	100%
20–60 years	30%	30%	40%	100%
Above 61 years	30%	60%	10%	100%

Source: Author, 2014.

Table 1.
Human activity valuation model.

Figure 5.
Development flowchart. Source: Author, 2012.

promoted and sustained their ability to do so. These stages include; Preparation, Learning, Productivity and Networking of scientific ideas.

This flow chart shows the importance of Preparation. Although the United Kingdom went through industrialization process without preparation, it started out of curiosity. This curiosity-driven industrialization process lasted for a long time before actualization but studying other countries like America, Singapore and the

Newly Industrialized Countries (NIC) we see the elements of planning and preparation and industrialization were achieved in less than 50 years.

The developed countries had to prepare for development; hence the precursor was a decision for industrialization. Before a child is born, the parents get ready for the arrival of the baby. In the same way, before a country becomes industrialized, the country must prepare for the industrialization process.

The nation needs to setup policies to get them ready for industrialization. The nation needs to be willing to be industrialized, the nation needs to start up a chain reaction that leads to industrialization and get to a state of readiness, especially for industrialization.

From history, it was observed that learning was taken very seriously by the industrialized nations. For example, a developing nation could be likened to a growing child. A baby sits and observes, recording everything everybody does and then begins almost immediately to do likewise. The baby who depended on others to always hold her now runs on her own. That child that could only babble now speaks clearly. It is good to know that the child has been developing. No parent would be happy if their child, after two years, has failed to speak and walk. How does a child achieve all these activities? Learning!

Learning is the second stage as shown in **Figure 5**, and it comes in different forms; Learning-by-doing and learning-by-adapting, learning-by-design and learning-by-improved design, and learning-by-setting-up a complete production system [24]. People do not learn by-letting experts do everything for them. If so, they will continually be slaves to the expert who knows and the learner will lack the opportunity to become an expert.

The third stage is Productivity. A developing nation needs to acquire knowledge and that knowledge obtained should be mandatorily applied in productive activities to increase the total performance and value of goods produced and services provided within a year. The use of this knowledge obtained improves the effectiveness of the production, i.e. being able to produce quality amounts of goods, and services, etc.

The fourth stage is Networking/Synergy. The term synergy comes from the Greek word *synergia* from *synergos* meaning “working together” and it simply refers to the interaction of multiple elements in a system to cause an effect different from or more than the sum of their individual effects. In this stage, government, the institution of learning and working practitioners network and communicate, bouncing ideas off of one another and thus, synergistically developing and/or refining innovative concepts and ideas. The Flow Chart of Development systematically integrates all these stages to present a simple and clear representation of the process which would attain sustainable development and industrialization.

Nations or individuals that intend to adopt the Development Flow Chart, also known as “YOUNG’s MODEL,” must first prepare themselves for development. Any man that follows this path is on the right path towards development. If not, it is dearth (starvation, Poverty and Lack).

4.6 Industrialization based entrepreneurs (model 6)

The developing nations have lately been focusing on fostering the spirit of entrepreneurship in the hearts of the citizens. This is a good move, but the right kinds of entrepreneurs need to be developed. This book concentrates on two kinds of entrepreneurs that promote industrialization and growth; the technological entrepreneur and the commercial entrepreneur.

The technological entrepreneur is a producer who is involved in a considerable amount of research and development and his activities greatly promote industrialization, see **Figure 6**.

Technological entrepreneurship requires innovative skills for the creation of new products, new production methods, discovery of new sources of raw materials, opening of new markets and creation of new forms of organization [27].

Technological entrepreneurs are the right kind of entrepreneurs every developing nation requires. These are the kind of entrepreneurs you need to breed; those who enjoy innovation and production; those who enjoy mixing different procedures and processes; those who love creativity.

Technological entrepreneurship aims at creating new products, designing new production methods, discovery of new sources of raw materials, opening new markets and developing new forms of organizations through innovative skills. The performance measurement for these entrepreneurs include; number of innovation, number of new markets and number of new market products, number of new raw materials, of new production process, number of new forms of organization.

4.6.1 The commercial entrepreneur

Commercial entrepreneurs aim at creating profitable operations resulting in private gain. The performance measurements for these entrepreneurs include;

Figure 6.
Schematic presentation of a technological entrepreneur. Source: Author, 2012.

Figure 7.
Schematic presentation of a commercial entrepreneur. Source: Author, 2012.

financial indicators, market share, customer satisfaction and quality. **Figure 7** is a diagrammatic representation of Commercial entrepreneurship. The producer determines how much the entrepreneur sells, and the time, quality and quantity of the goods to be sold. If the producer decides to pull out from that market the commercial entrepreneur is automatically knocked out of business.

The commercial entrepreneur is totally dependent on the producer. He is usually referred to as the lazy entrepreneur. He is not involved in productive activities. His research, development and innovative activities shall be limited to market and organizational innovation. All he needs to do is study a market; find out their need or the product demand of the market, link with the producer of such product and act as a middle man who supplies the needed product to the market. The entrepreneur buys from the producer and supplies the market, simple!

However, the risk involved in being a commercial entrepreneur is far too great. We need both technological entrepreneurs and commercial entrepreneurs because when production meets distribution we attain optimum consumption and standards of living increase. It is paramount we have more technological entrepreneurs to boost economic productivity, because an increase in economic productivity increases economic strength, growth, development and industrialization.

5. Conclusions

A manufacturing revolution has emerged in the past 50 years that is as significant as the industrial revolution of the 19th century. The industrial revolution, which captured the introduction of radically new production technologies diffused across the globe and has fundamentally affected the nature of global production, birthed the manufacturing revolution.

Limited knowledge and ability of its people to create new innovations are the greatest challenges facing industrial process in developing nations. Failure to continuously strengthen and increase our knowledge base will surely result in a declining ability to provide for the needs wants and of our people. When increased productivity is viewed as a generator of wealth, the importance of innovation is clear. Employment opportunities in many industries will increase tremendously as productivity increases. Indirect employment will be created as well.

Moves towards industrialization are scarce and hesitant in developing countries. This is as a result of the copy and paste policy syndrome from industrialized nations by developing nations, without knowledge that there is no general rule or prescriptions for industrialization change. Policies should be specifically tailored to the capabilities of the particular country with more selective options requiring the highest levels of capabilities.

Simply put, these two challenges namely; (1) limited knowledge and knowledge acquisition processes, and (2) the poor policy formulation process are the main causes of Africa's problems. They are both associated with our thinking process and it's been proven that our actions are fruits of thoughts. When these challenges are tackled, a smooth journey to industrialization for developing nations like ours would be ensured.

Historically, a large majority of the citizens of developing nations were denied the benefits of the industrial revolution. Many of them were cheap slaves and contractual servants; thus robbing them of their uniqueness, self-esteem, poise and confidence.

However, despite the change in state of affairs; with developing nations gaining a greater measure of freedom and independence, many of the citizens of developing countries are still struggling with their uniqueness and their sense of self-worth.

Many of the nations that progressed and developed through the industrial revolution have reinforced (by attitude, policies, and legislation) the notion that the citizens of developing nations do not possess the potential to develop the skills, intelligence and sophistication necessary to equal that of industrialized nations.

The developing nations in effect are led to still look to the industrially developed states for their measure of standard, quality and excellence. This in turn breeds a sense of disrespect and suspicion for their own products and a denial of the great potential that lies dormant in the citizens of developing nations everywhere. There is still the notion that the presence of a foreign element is necessary for the maintenance of excellence and quality. This is not true! Citizens of developing nations are great; they possess the intelligence for transformation and the sooner we realize this truth and believe in our ability to stimulate the industrialization process; only then will the journey to industrialization begin.

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Thank you for embracing performance enhancement principles.

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