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PROMOTING SUSTAINABLE ECONOMIC GROWTH AND INDUSTRIALISATION: SOLUTION TO MASS UNEMPLOYMENT AND POVERTY

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Abstract

This paper analysed the twin-problems of unemployment and poverty. The methodology adopted in the analyses was a combination of the historical and logico-mathematical research perspectives. The results showed that the technologically advanced nations (TANs) experienced mass unemployment, low productivity, high inflation and prevalent poverty problems for many centuries before they achieved industrial revolution (IR). When they achieved the modern IR, not only did the mass unemployment problem disappear, but also, there were not enough adults persons to fill the employment openings created by the industrialisation. Consequently, industrialists resorted to employing children who worked in factories for many hours everyday, and prevented them from receiving education. Unemployment and poverty, therefore are symptoms of stagnation and lack of industrialisation (the disease). The long-term solution to mass unemployment and poverty therefore is industrialisation, for there is no industrialised nation that is poor. The short-term solution is promoting sustainable economic growth and competence-building. However, because achieving sustainable economic growth, competence-building and industrialisation are learning processes, Nigeria and other developing nations need to develop good educational systems. They should also establish suitable frameworks for training university graduates, scientists and engineers in particular in a curriculum-based scheme to acquire complementary practical skills in the economy outside campuses. This is how the poor nations can achieve sustainable growth, build-up individual and national competence, promote industrialisation and eliminate unemployment and poverty problems, speedily.

Key words: Sustainable economic growth, Industrialization, Unemployment, Poverty

Introduction

Think before you act! This injunction is an important one to heed, because it warns that unless we understand a particular problem and our conception of it is correct, we cannot solve it. Unfortunately, not many people think that it is necessary to understand a problem before embarking on the activities aimed at solving it. It is common to hear African intellectuals and intelligentsia say: let us just start from somewhere. In order words, let us not worry about the appropriate place to begin; let us just act without thinking.

There is need to understand the problem or concept of unemployment and poverty. This is because no one solves the problem he does not understand. Nigeria and other developing nations can gain from the experiences of the technologically advanced nations (TANs). Some pertinent questions at this point are: Did the TANs experience mass unemployment and poverty in the past? What is responsible for unemployment and poverty problems? Is there any relationship between mass unemployment, low productivity, high inflation and prevalent poverty? What then is the solution to mass unemployment and poverty?

This paper is written to demonstrate that employment is the blood of an economy and industrialisation is the antidote to poverty. Rapidly growing economies demand employment of all categories; stagnating economies

experience mass unemployment. Unemployment, as such is a critical symptom of stagnation (the disease). Hence, promoting sustainable economic growth, competence-building and rapid industrialisation is the solution to mass unemployment and poverty in any society.

Some Development Experiences

The area now occupied by modern France, Britain, Germany, Italy, Spain and Portugal, was harnessed into the Roman empire in 55 B.C. (Carrington and Jackson, 1954). The western portion of the empire broke up in 406 A.D. Life in the Medieval period (0 – 1500 A.D.) in Europe was rooted in the land, whether in royal domain or in the lord's manor (Green, 1964). By the end of the 16th century, many thousands of common people were forced to wander from place to place, reduced to begging, stealing and prostitution. Able-bodied, idlers were ordered lashed or imprisoned. With rising misery and poverty, it became necessary to establish a framework for dealing with the malaise. The English Poor Law was enacted in 1601. It established alms-houses; tried to provide for able-bodied poor, arranged apprenticeships for destitute children and provided money, food or shelter for the helpless (Lens, 1971). Pixen and Cloward (1971) observed that government welfare programmes have traditionally been little more than techniques to pacify the politically dangerous poor. The Poor Law may have been a political move to prevent armies of the poor from rebelling against the crown (Lens, 1971).

A common belief in an agrarian economy is that the real solution to unemployment and poverty is to provide land for able people to farm and make a living by themselves. This thinking probably also influenced the actions taken by individuals and government concerning England poverty and unemployment problems during the early 1600s (DeFleur et al., 1977). It was during the early 1600s that Charters were first issued for establishing colonies in the New World (America). Such ventures were probably perceived as solutions to the problems of the English poor. The healthy and able-bodied poor could be sent to colonies where people were in short supply and there was uncultivated land. That was the beginning of how the English poor were exported to America (DeFleur et al., 1977). Sufferings and poverty continued in Britain for many more centuries. The general grievance, civil wars and military rule in England during the period 1640 – 1688 had to do with unemployment and poverty.

Britain achieved the first modern Industrial Revolution (IR) in the period 1770-1850 (Gregg, 1971). The desirable transformation changed the situation drastically. Thus, the change came to the English people after almost 2000 years of European nations.

In a period of about 170 years, thirteen colonies had been well established in America and the people in them started feeling like Americans (Baldwin, 1969). The thirteen original colonies declared their independence from the British crown in 1776. Britain considered the declaration a revolt against the crown. Consequently, the Americans fought the Revolutionary War or the War of Independence 1775 – 1783, with Britain. The Americans, helped by European nations, won the war and became independent of Britain.

During the early 1800s, America was a village-nation; over 90 per cent of America was made up of villages which largely had no contact with each other; mother, father and children worked to provide food, shelter and clothing (Bartlett, et al., 1969). America achieved the modern IR in the period 1850 – 1900. Again, the IR brought great improvement in the standard of living of the Americans. The Americans achieved the feat in just about 300 years.

The Chinese claim that the existence of their nation dated back to about 4000 B.C., but more objective sources suggest that the nation's existence dates back to about 1000 B.C. (Eberhard, 1950). Chinese rapid industrialisation began with Mao Zedung revolution of 1949 (Stokes and Stokes, 1975). Japan claims that its existence dates back to 660 B.C. and therefore celebrated its 2600th anniversary loudly in 1940 (Hall, 1971). More scientific methods suggest that Japan's nationhood began at about 300 B.C. Japanese modern industrialisation took place in the 20-year period 1886 – 1905 (Hall, 1971; and Stead, 1906). The Asian industrialisation endeavours took well over 2000 years.

Growth and Industrialisation Theories

History shows that Europeans and Asian nations became industrialised after toiling for about 2000 years and were thereafter able to do many things they were unable to do before the industrialisation. It follows that their national competence increased during 2000 years from very low level to very high level. Hence, the desirable growth for a nation is that which increases individual and national competence. Besides, to have grown from low level to high level, the growth had to be sustainable and largely irreversible.

Therefore, there are two types of growth. They are: (1) true growth and (2) trivial growth. True growth is one that increases individual and national competences. True growth is sustainable and largely irreversible. Trivial

growth is one which does not promote individual and national competence. Trivial growth is reversible and non-sustainable. Mere increase in gross domestic product (GDP), foreign reserves and capital investments are trivial growth (Ogbimi, 2003). This is so because they do not necessarily increase individual and national competence.

Pritchett (2000), examined patterns of economic growth and found out that nothing that is true of the United States (U.S.) growth in the gross domestic product (GDP) per capita or that of other Organisation for Economic Co-operation and Development (OECD) nations is true of the growth experience of developing nations. Volatility, however defined, is much greater in the developing world than in industrialised nations. Pritchett's analysis showed that most sub-Saharan African nations did not achieve true growth in the period 1960-1992; they probably achieved trivial growth or stagnated.

Achieving True Growth and Industrialisation.

Achieving sustainable economic growth, industrialisation and development (SEGID) is a learning process (Ogbimi, 2003). Every man and every woman are born as crying babies. The healthy baby soon begins to babble, that is, learns how to talk; acquires the capabilities to talk and then talks (Ogbimi, 1990). The baby who could not babble grows up to be a dumb adult person. Thus, it is through learning that man acquires the capabilities to talk. All other capabilities (competences) are acquired through learning. One who wants to be a dancer has to learn how to dance. One who wants to be a singer has to learn how to sing. The talented pianist must learn the ordinary tunes before using his talents to combine them to produce extra-ordinary tunes (Ogbimi, 1990). Nigeria and other poor nations must educate and train the people to produce the modern products they now import, if they are ever to make them and be self-reliant. Competence is not a commodity that can be bought instantaneously when a critical shortage is real; competence being the sum of knowledge, the ability to learn and experience is uniquely related to man (Brautaset, 1990).

The objective values of the learning-man and learning-woman appreciate in a compound fashion with learning intensity and time (Ogbimi, 1992). The learning-man is therefore an appreciating asset; learning-people are appreciating assets (AAs). All structures like road and telecommunication networks, industrial plants, real estate, automobiles, aeroplanes, furniture, etc., on the other hand are depreciating assets (DAs), because their values depreciate with usage and ageing. When a person commences an educational or apprenticeship programme, he or she begins from the novice level and advances to the position of the expert. The growth achieved this way builds up competence and it is sustainable. Usually, at the end of the first year of learning, the learning-person is promoted from level 1 to level 2, having learnt the things scheduled for level 1. At the end of the second year, the learning-person again moves to the third learning level, having completed learning the things to be learnt in level 2. The learning-man builds up competence or capabilities – the ability to do things including providing service and production. Many young boys with little or no education enter mechanic and electrical workshops to learn, and at the end of three years they are able to repair cars and many electrical appliances. This is because they acquire the necessary competence or capabilities from learning in the workshops.

The growth achieved by the learning individual is a true, irreversible and sustainable one. When the individual is promoted from learning level 1 to 2, what he or she had learnt at level 1 sustains him in level 2. Similarly, when the learning-man moves to level 3, he is sustained by the knowledge acquired from levels 1 and 2. Figure 1 shows how the learning process builds-up competence, including production strength (Ogbimi, 2003).

The intrinsic value of the learning-man may be represented as (Ogbimi, 1992):

$$M_n = M_0 (1 + r)^n \text{ ----- (1)}$$

where M_n is the value at time $n = 1, 2, \dots, n$; M_0 is the initial value before learning commences; and r is the learning rate or intensity. A graph of $(1 + r)^n$ vs n demonstrates how the growth achievable is dependent on the learning rate. Figure 2 shows the graph. The graph explains why industrialisation took Britain, the United States, Japan and China different periods of time to achieve. Their learning-rates were different from each other.

In all learning processes, the rate of progress is determined by the rate of learning; high-intensity learning leads to rapid progress and vice versa. Maddison (1995), showed that between the period 1870 and 1980, the United States grew 1.84 per cent per year, Great Britain grew 1.24

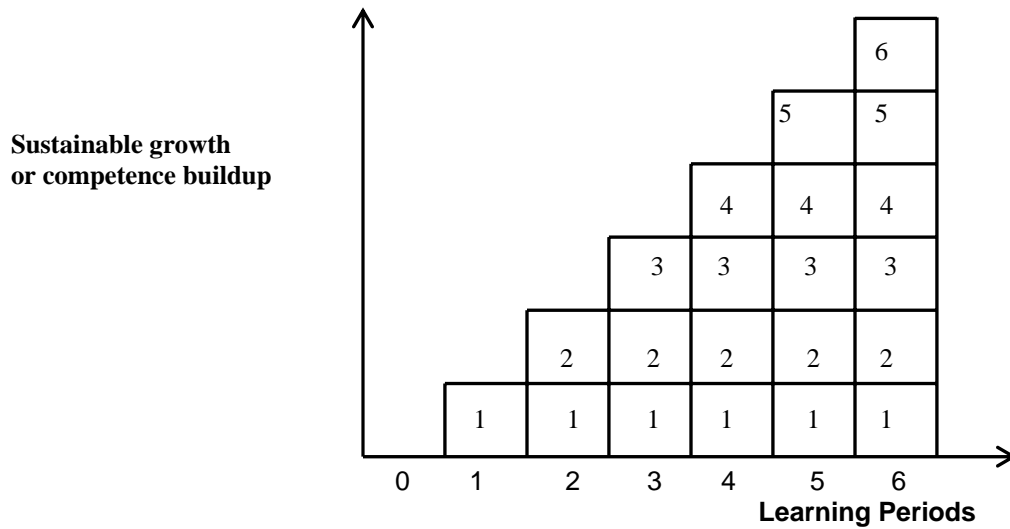


Figure 1: Schematic of how competence builds-up in the learning process.

Achieving industrialization

This $(1+r)^n$ transformation may be likened to that which the spider achieves when it transforms many of its silk-threads into a web. The single thread is a relatively weak structural material which fails under any stress condition. However, the web made from many of the relatively weak threads is a potent tool which catches many small creatures on which the spider feeds per cent, and Japan grew 2.64 per cent. These results are reflections of the learning-intensity in the nations during the period.

When more than one person, N is involved in the learning process, the value function of the contributions of all the learning-people to the growth of the nation M_e becomes:

$$M_e = NM_0 (1 + r)^n \text{ ----- (2) (Ogbimi, 1995a)}$$

with notation as in equation (1) maintained. As many people learn and acquire theoretical knowledge and practical skills, that is as N becomes very large, a point is reached when each skill/knowledge type begins to enjoy the support of others and an invisible knowledge and skills-framework is formed (Ogbimi, 1999).

The society then achieves industrial maturity (or puberty). Productivity increases dramatically and the society is said to have achieved Industrial Revolution (IR).

When a nation achieves the desirable economic transformation, the contributions of the learning people to the strength of the economy become:

$$M'_e = NM_0L(1+r)^n \text{ ----- (3)}$$

Or more generally,

$$M''_e = \sum_i \sum_j \sum_k \sum_l \sum_p N_i M_{0j} L_k (1 + r_l)^{n_p} \text{ ----- (4)}$$

where L represents the transformation and N_i represents the number and types of people employed in productive work, M_{0j} represents the educational/training levels of the work force and the people of the society, L_k represents the breadth and depth of the linkages among the knowledge and skills in the economy(or the strength of the knowledge and skill framework), r_l represents the different learning rates among the employed work force and the people of the society, while n_p represents the learning experiences or how long the work force categories and

n	0	1	2	3	4	5	6	7	8	9	10
r = 1	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.11
r = 5	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63
r = 10	1.00	1.10	1.21	1.33	1.46	1.61	1.77	1.95	2.14	2.36	2.59

r = 10 %

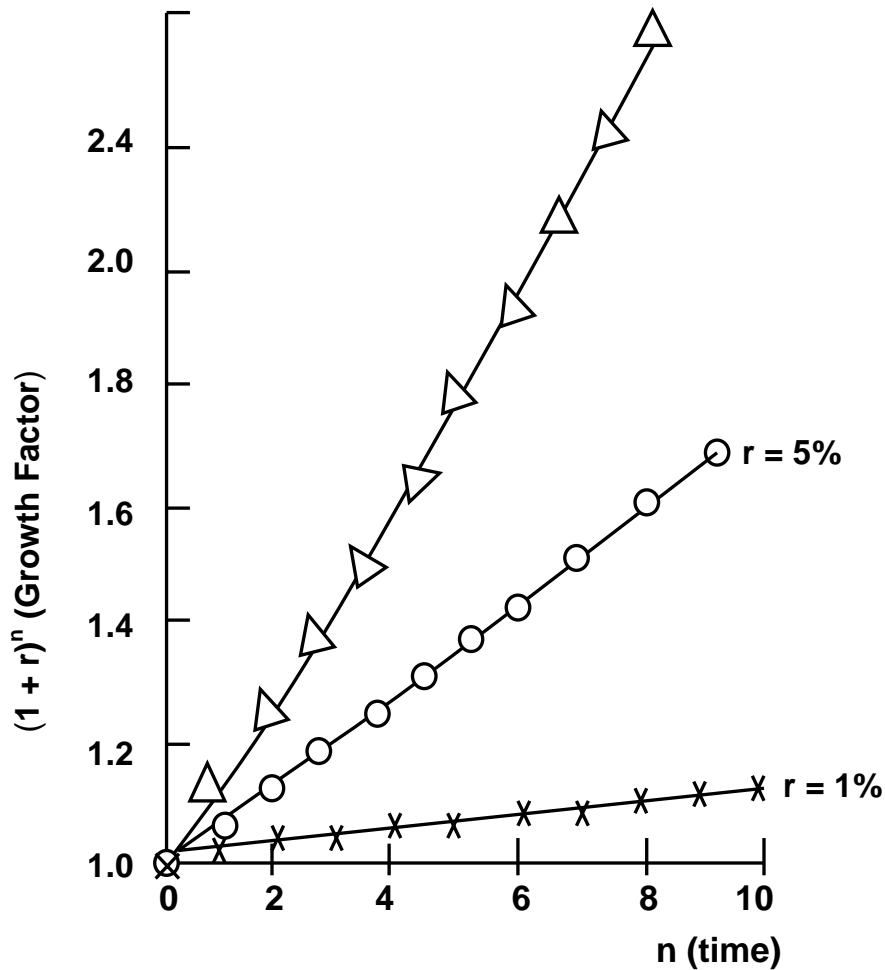


Figure 2: Graphs of $(1 + r)^n$ vs n from the growth function $P = P_0 (1 + r)^n$, for r = 1, 5 and 10 percent.

people have been learning. Equation (4) suggests that increase in employment (N_i), education and training (M_{oj}), linkages (L_k), learning rate (r_l) and learning experience (n_p) improve the production strength or competence of a nation (M_e').

Five learning-related variables: N_i , M_{oj} , L_k , r_l and n_p are therefore the relevant indices for planning for industrialisation. The variables together determine the state of industrialisation. The higher are the values of these variables, the stronger is the economy.

The industrialisation process is illustrated in figure 3. The figure shows how the state of an economy depends on the five learning variables. The figure shows that different growth rates characterize the pre-industrialised and industrialised economies.

Diversification – the development status where the various sectors of an economy begin to function effectively is a fruit or aftermath of the industrialisation process (Ogbimi, 2003). Reliable and sustainable infrastructure, advanced agriculture, healthy banking sector, etc., are fruits of industrialisation. An artisan/craft economy cannot sustain advanced infrastructure. There is a precedence in the development process. We cannot erect power plants in an artisan economy and expect regular electric power supply.

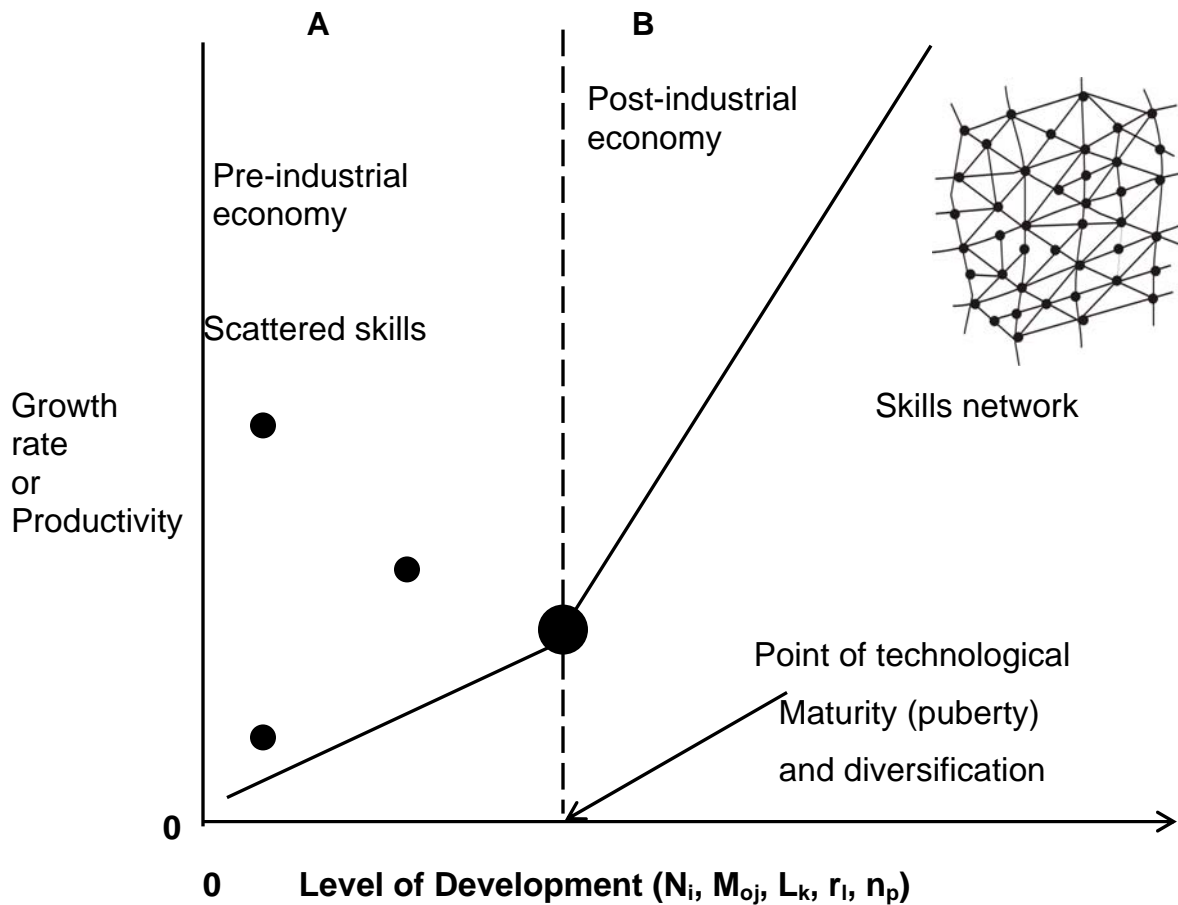


Figure 3: Schematic illustration of the industrialisation process.

Industrialisation is a Transformational change

The industrialisation process is a transformational change of an economic status from an undesirable status (UDS) into a desirable status (DES) as shown in figure 4 (Ogbimi, 1995). Industrialisation is not an equilibrium change. It is therefore inappropriate to subject its analysis and management to equilibrium or supply-demand principles. Most Western economies achieved the modern industrialisation more than one hundred years ago and

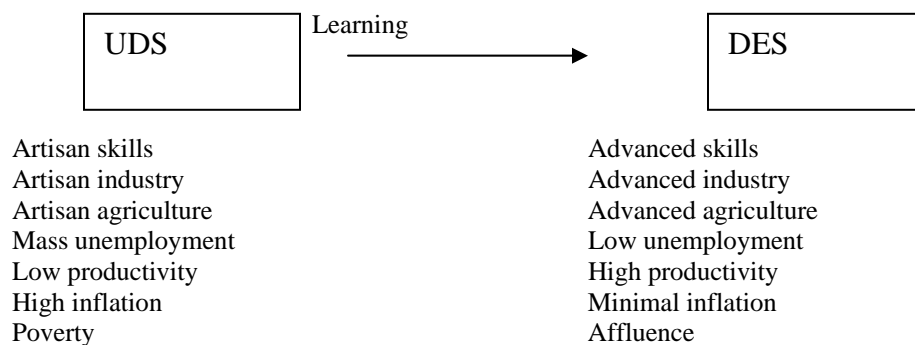


Figure 4: The transformation which characterizes industrialisation

they have not reverted back to the artisan/craft and agricultural economies they were before they were transformed. It is therefore correct to say that industrialisation is a transformation or a relatively permanent change. Our theories show that industrialisation is the cumulative result of learning by a society. Learning progresses from the learner's position to the expert's position (Stahl, 1990). Learning results in relatively permanent changes in knowledge, skills and other behaviours (Klausmeier, 1985). Industrialisation is a transformation facilitated by learning.

Industrialisation is a scientific transformation; it is a transformation of an ignorant and agrarian society into a knowledgeable and scientific one. Amrine et al. (1982), revealed that the Western IR which began in England was characterized by 8 (eight) innovations by 1800 A.D. Six (75 %) of them were conceived and developed in England and one (12.5%) each was conceived and developed in America and France. It can be inferred that the IR first occurred in England because it was the first nation to be ready for it scientifically.

Industrialisation is an economic transformation. Before the IR, Smith (1776) had described England as a nation of shop-keepers; by 1776, England was a nation of farmers and petty traders. The farmers produced corn, wool and meat for their consumption and only exported excess production (Trevelyan, 1948). The population of England was about 7 million in 1700 A.D. All European nations were village-nations. The annual revenue of England in 1700 was about £7 million (seven million pound sterling). By 1900, England had become industrialised; the nation became one which manufactured goods and sold them in foreign nations (Trevelyan, 1948). The revenue of Great Britain in 1900 had risen to £770 million, over 100 times. Most people worked for weekly wages by 1900.

Industrial Revolution (IR) is characterized by very rapid economic growth. Growing economies demand employment of all categories (Lewis, 1972). Umo (1998) claimed that there is a mis-match between the products of tertiary educational system especially universities and market demands in Nigeria, hence there is unemployment in the nation. This diagnosis is not correct because there is no mis-match problem in a rapidly expanding economy. The evils of child-labour and too-many hours-labour associated with the Western industrialisation had to do with shortage of labour. There was no public primary school system in Britain when the nation achieve the first modern IR, and industrialists fought against its establishment for a long time, claiming that its establishment would keep many children away in school and prevent them(the industrialists) from using the children as labourer in their factories (Dent, 1975). The illiterate children were not considered a mismatch in the rapidly expanding British economy. The problem in Nigeria and other African nations is stagnation; unemployment and poverty are symptoms of stagnation.

What is the implication of the fact that the industrialisation process is a transformational change facilitated by learning, rather than an equilibrium or a supply-demand relationship governed by profit considerations? The implication is that the rate of industrialisation can be increased by increasing the learning rate in a society. In a supply-demand situation, those who have interest in it procrastinate by waiting for the desired profit level. Rapid industrialisation and development are the most important factors for building an economically and politically strong society that everyone would like to belong to and be proud of (Ogbimi, 2002). It is unwise to leave the industrialisation of a society to market forces and their procrastination.

Relationship among employment, productivity and inflation in an economy

Ogbimi (1995), demonstrated that the relationships among employment, productivity and inflation are as shown in figure 5. The illustrations show that, the economic well-being of any society is defined by three inseparable variables: co-existent levels of employment, productivity and inflation.

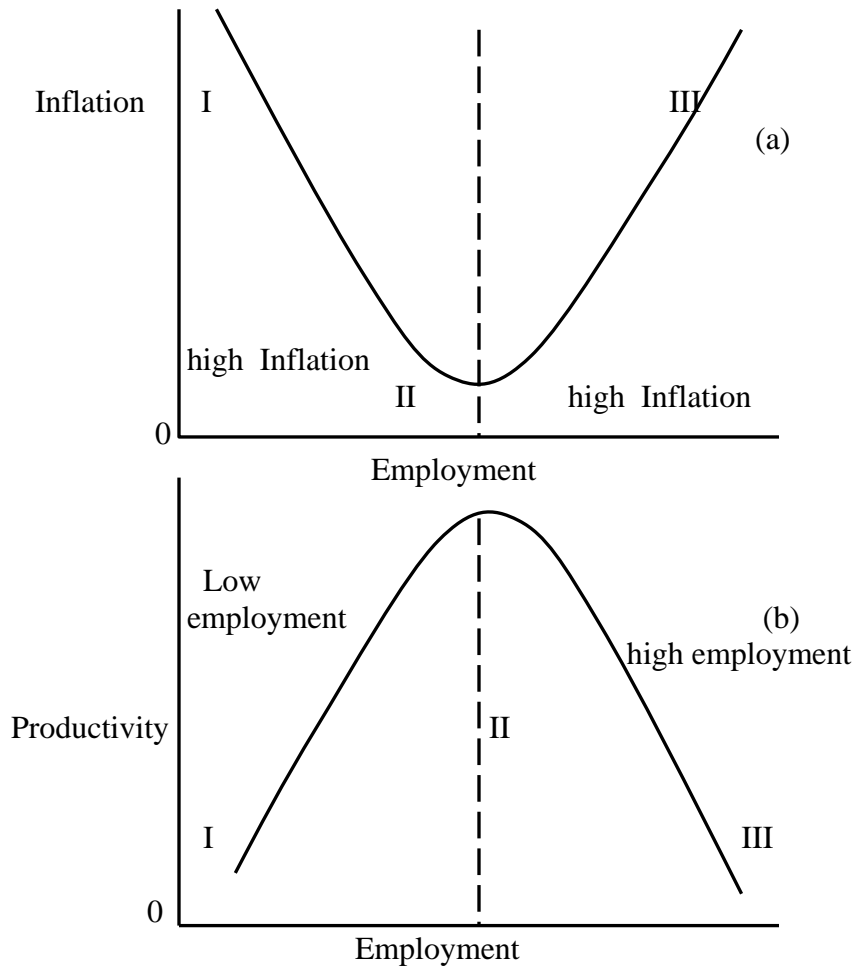


Figure 5: The Relationship of Inflation (a) and Productivity (b) to Employment.

In particular, any economy is either in or close to one of three fundamental statuses. These are:

- I : characterized by:
 Low employment (mass unemployment),
 Low productivity, and
 High inflation.
- II : characterized by:
 High employment (low unemployment)
 Optimal productivity and
 Minimal inflation.
- III : characterized by:
 Full employment (no unemployment),
 Low productivity, and
 High inflation.

The analysis shows that employment is the independent variable while productivity and inflation are the dependent variables. This means that a given employment level determines the level of productivity and inflation in the economy. Employment in the analysis has the properties of quantity and quality. A firm which employs 10 employees who are illiterates has employment different from that which employs 5 illiterates and 5 secondary school graduates. Although the quantity of employment is the same (10), the qualities are quite different. Employment in the analysis is also a measure of the learning taking place in the economy.

All artisan/craft economies like Nigeria's are in or close to position I – the least desirable one. The Newly Industrialising Countries (NICs) like China and Malaysia are close to position II – the most desirable one. Position III is utopian, because no nation gets there in a profit-base economy. Philips (1958) guessed wrongly that poorly managed post-industrial and post-World Wars-boom Western economies were in position III where there is a trade-off relationship between unemployment and inflation. All economies are in the region between positions I and II. The Western post-World War II economic boom was due to its high employment policy in the period late 1940s – late 1970s.

Industrialisation transforms an economy from position I to position II. This, according to figure 5 demands a deliberate increase in employment (in quantity and quality). To wait for market forces to industrialise a nation is to disregard the advantages associated with the fact that industrialisation is a transformational change and to subject the society to unnecessary sufferings and delay in the development process.

Solution to Mass Unemployment and Poverty

Ogbimi (1995), observed that employment is the blood of an economy. Equation (4) and figure 5 support this observation. Ogbimi (2003), also likened the healthy economy to a well inflated football; they both bounce. Whereas the well inflated ball is filled with high-pressured gas, the healthy economy is full of many millions of highly knowledgeable and skilled workforce. The weak economy in this context is the one devoid of a well educated and trained workforce. How soon Nigeria becomes industrialised and be able to solve the problems of mass unemployment, low productivity, high inflation and poverty, depends on how speedily it develops the many millions of knowledgeable and skilled people needed to cause the transformation.

Developing the knowledgeable and skilled people is a two-phase process. First, the people need to be educated to very high levels, university, preferably. Second, the individuals who have had advanced education are trained in the workplace. Education develops the mind and character and equips the individual with the ability to think and provide theoretical solutions to present and future problems (Ogbimi, 2005). Training equips the individual with practical skills. Anyone who possesses theoretical knowledge or practical skills alone, is a mediocre (Ogbimi,1991). Nigeria has a mediocre work force; the education graduate and the artisan/craftsman in Nigeria are mediocres. Nigeria needs to place equal emphasis on acquiring theoretical knowledge and practical skills to produce a versatile and productive workforce. Other developing nations also have mediocre workforce. Skills are acquired in the working place (Bright and van Lamsweerde, 1993) or from the on-the-job training (Kanawaty, 1985). Waiting for employment to develop skills to promote industrialization, is tantamount to waiting for the atmosphere to inflate a tire to 30 atmospheres and to forget that the process is a transformational change and to subject it to market or supply-demand principles and its procrastination.

Educational institutions are therefore crucial and central to achieving rapid industrialisation, because they equip the people with theoretical knowledge. Promoting rapid industrialisation in African nations and eliminating the age-long unemployment and poverty crisis require that education must be complemented with on-the-job training of university graduates so that they can acquire complementary practical skills.

Industrialisation is not about erecting structures, it is about developing competences for doing uncountable things. Industrialisation is an all-encompassing process. Developing nations, African nations in particular, need to set up a framework for training university graduates in a curriculum-based scheme for 3 – 4 years, so as to acquire the skills for modernizing their traditional activities and for studying, servicing, maintaining, and duplicating, and eventually improving upon the things they import today.

Nigeria and other African nations need to give opportunities to the science and engineering graduates to input the theories they acquire in universities into their artisan-agriculture; artisan/craft activities like black-smithing, wood-works, textiles/tailoring, construction works, etc.; and factory floor worksettings and all other places where skill acquisition opportunities abound. This is how they can produce individual youths that can develop independent thoughts about everyday problems – the Industrialisation Vanguard (IVs). Nigeria needs to produce 10 – 15 million IVs to achieve accelerated industrialisation.

Consider the illiterate artisans who service and maintain all the modern things Nigerians import today, they sustain the consumption of the modern products in the nation. What do you think would happen when Nigeria produces millions of university science and engineering graduates who also possess the practical skills the artisans have and more? Nigeria's national productivity would improve speedily. The IVs would begin to manufacture some of the items Nigeria now imports. Nigeria would then be getting ready for rapid industrialisation.

The National Directorate of Employment (NDE) was set up in the late 1980s. The Industrial Training Fund (ITF) Students Industrial Work Experience Scheme (SIWES) and others like it do not meet the required training. This is so for many reasons. First, these training schemes are not based on any theoretical premise. Second, they are not

curriculum-based hence they rarely build-up competence. Third, they are poorly organised with too little stipends. Fourth, it is doubtful if they were set up to achieve defined objectives. Fifth, they are poorly supervised. Sixth they do not last long enough to equip the youths with adequate skills.

Additional Empirical evidence.

The Asians intuitively know that learning is the fundamental basis of self-reliance. That explains why they are credited with the adage which says: *teach me how to fish so that I can catch fish myself whenever I want to eat fish*. History shows that one society learns from another and this is the basis for improving the productivity of the society with the lower productivity. Europe began the modern era with almost total dependence on the Chinese, Indian and Islamic cultures – the Great Medieval Civilizations (Cardwell, 1974). England was accused by continental Europe of copying its inventions and being unoriginal, just before England achieved the first modern IR. The learning society is the progressive one. America later learnt from Europe, Japan learnt from Europe and America. It is probably the turn of Africa to learn actively from Europe, America and Asia. The English learnt *laissez-faire* and spent about 2000 years to achieve modern IR.

The belief that the future of America rests on sound public education was common among early American leaders, though they themselves did not have opportunities for good education (Hicks et al., (1970). Consequently, Americans displayed fully the versatility of an educated people. The New England States were the first to establish public schools to educate all young people (Bartlett, et al., 1969). It was also in these states that sound and systematic education had been practiced longest and where it was most developed that the greatest manufacturing development occurred first.

The young boy's mind was first prepared by school discipline and education. He then began to acquire one type of skill after the other, never satisfied with any single skill type. Also, doing one mechanical operation never satisfied his employer. The young American learnt always at that time (Bartlett et al, 1969).

The economic progress of the United States was marked by increasing numbers of workers in agriculture, manufacturing and construction and the average education and training of the work force. In 1870, the total number of workers, N_t in equation (4) was about 12.9 million, with 6.4 million in agriculture, 2.3 in manufacture and 750,000 in construction. In 1890, the corresponding figures were 23.7, 10.0, 4.8 and 1.4 million. In 1910, the corresponding figures were 36.7, 11.3, 8.2, and 2.3 million. In 1930, the figures were 47.4, 10.2, 10.8, and 3.0 million (U.S. Census Bureau, 1942). The U.S. 1998 Census showed that 132.5 million people were employed in the nation and over 25 per cent of the population possessed B.A. or B.S. degrees. America had over 3300 degree-awarding institutions in the 1985/86 academic year (Johnstone, 1986).

There were less than 40,000 factory workers in Nigeria in 1995 (MAN, 1995). Nigeria factory workers are mainly illiterates; there is probably about one university graduate to about 100 employees among factory workers in Nigeria (Ogbimi and Akarakiri, 1997). Nigeria has probably not produced one million university graduates yet (NUC, 1995). Because Nigerian university graduates only acquire theoretical knowledge, most are unemployed. Nigeria has been retrenching workers in the public and private sectors for about 20 years. Nigeria remains an agrarian and craft/artisan economy – a deflated economy.

Summary and Conclusions

The problems of mass unemployment and poverty have been analysed. On examination of history, it was found that European nations experienced mass unemployment and prevalent poverty problems for almost 2000 years, achieved Industrial Revolution (IR), and solved mass unemployment and poverty problems. China and Japan toiled for more than 2000 years before achieving the modern IR; the United States (U.S.) toiled for less than 300 years to achieve the modern IR and to become a world power. History therefore shows that lack of industrialisation is the problem; mass unemployment and poverty problems are indeed the symptoms of lack of industrialisation or stagnation (the disease).

It was demonstrated that the modern industrialisation is a learning and competence- building process. Man alone learns; machines and other structures do not learn. The learning-man and learning woman are Appreciating Assets (AAs), because their values grow with learning-intensity and time. All structures that capital investment (including foreign direct investment) may erect and all natural resource endowment are either Depletable or Depreciating Assets (DAs), because their values depreciate with usage and ageing. Hence mere erection of structures does not increase national competence.

In all learning processes, the rate of progress depends directly on the learning rate; high-intensity learning reduces the time to achieve IR and vice versa. Scaling of the value-function demonstrated that modern IR is the

cumulative effect of the sustainable and irreversible economic growth achieved by individuals and a nation over a period.

The scaling also showed that the five learning-related variables relevant for planning for industrialisation are: N_i – the numbers and types of people involved in productive (learning) activities; M_{oj} – the educational/training levels of the employed and people in the society; L_k – the linkages among the knowledge and skills possessed by the people of the society; r_p -the learning rates of the people and nation; and n_p the learning experience of the employed, people and the nation. The equation which relates the variables to the strength of the economy, M_e'' , showed that the competence of the nation increases with increase in the values of all the variables; increase in employment increases the economic strength of an economy.

On examining the nature of the industrialisation process, it was revealed that it was a transformational change facilitated by learning. Industrialisation transforms a society from a pre-industrialised (undesirable) status into a (desirable) post-industrialised and affluent status. Industrialisation also transforms an agrarian and artisan/craft nation into a scientific one. Industrialisation is an irreversible process. The implication of the fact that industrialisation is a transformational change facilitated by learning is that the time for industrialisation can be reduced by increasing the learning rate.

The relationships among employment and productivity and inflation showed that Nigeria and other developing nations need to increase employment (in quantity and quality) deliberately, to promote sustainable growth and industrialisation, and to eliminate unemployment and poverty.

Education and training are the principal learning tools for increasing employment in quantity and quality, promoting improved productivity and reducing inflation. Educational system is therefore the most central instrument for promoting sustainable growth and industrialisation and eliminating unemployment and poverty. However, education must be complemented by training for the acquisition of complementary practical skills. African nations therefore, need to set up a framework for training university graduates especially scientists and engineers to promote industrialisation and elimination of the national loss associated with mass unemployment. Existing units and schemes for training are not suitable for providing the complementary training.

References

1. Amrine, H., T. Ritchey and O.S.H. Hulley (1982). *Manufacturing Organisation and Management*, Fourth Edition, Prentice-Hall, Englewood Cliff, New Jersey, U.S.A.
2. Baldwin, L.D. (1969). *The Stream of American History*, Fourth Edition, Van Nostrand Reinhold Co., New York.
3. Bartlett, I., E. Fenton, D. Fowler and S. Mendelbaum (1969). *A New History of the United States, An Inquiry Approach*, Holt, Rinehart and Winston, Inc., New York.
4. Brautaset, K. (1990). *Engineering Education in Norway and Reflections on Engineering Education in General*, Proceedings of the 1990 Annual Conference of the American Society for Engineering Education (ASEE), in Toronto, Canada, pp. 406 – 410.
5. Bright, P. and C. Van Lamsweerde (1993). *Environmental education and training in Royal Dutch/Shell Group of Companies*, UNEP Industry and Environment, October – December, pp. 28 – 31.
6. Cardwell, D.S.L. (1974). *Turning-Points in Western Technology: A Study of Technology, Science and History*, Science History Publication, New York.
7. Carrington, C.E. and J.H. Jackson (1954). *A History of England*, Cambridge University Press, England.
8. Defleur, M., W.V.D. Antonio, L.D. Nelson and C.H. Adamic (1977). *Sociology: Human Society*, Second Edition, Scott, Foreman and Company, Dallas, Texas, U.S.A.
9. Dent, H.C. (1975). *The Educational System of England and Wales*, Second impression UNIBOOKS, University of London press Ltd., London.
10. Ebehard, W. (1950). *A History of China*, Routledge and Kegan Paul, London.
11. Green, V.H.H. (1964). *Renaissance and Reformation: A Survey of European History between 1450 and 1660*, Second Edition, Edward Arnold Publishers Ltd., England.
12. Gregg, P. (1971). *A Social and Economic History of Britain 1760 – 1970*, Sixth Edition Revised, George G. Harrap and Co. Ltd., London.
13. Hall, J.W. (1971). *Japan: from Historic to Modern Times*, Second Print, Delacorte Press, New York.
14. Hicks, J.D., G.E. Mowry and R.E. Burke (1970). *A History of American Democracy*, 4th Edition, Houghton Mifflin, Boston, U.S.A.
15. Johnstone, O.B. (1986). *Sharing the Cost of Higher Education*, College Board Publications, New York.

16. Kanawaty, G.(1985). Training for a changing World: Some general reflections, *Int. Labour Review*, **124(4)**: 401-409.
17. Klausmeir, H. J. (1985). *Educational Psychology*, Fifth Edition, Harper and Row, New York.
18. Lewis, W.A. (1972). *Theory of Economic Growth*, Tenth Printing, Unwin University Book, London.
19. Lens, S. (1971). *Poverty: America's Enduring Paradox*, Thomas Y. Crowell Company, New York.
20. Maddison, A. (1995). *Monitoring the World Economy, 1820 – 1992*. OECD Development, Paris.
21. Manufacturers Association of Nigeria (MAN)(1995). 1995 Report, MAN's House, Lagos.
22. National Universities Commission (NUC)(1995). *Nigerian University System: A parastatal Past, Present and future*, A Report prepared for the National Constitutional Conference Committee on Civil Service and Parastatals, Abuja..
23. Ogbimi, F.E. (1990). *The Nature of Technological Development: Implications for Engineering Education and Technology Transfer*, a paper presented during the 1990 Annual conference of the ASEE in Toronto, Canada.
24. Ogbimi, F.E. (1990a). *Blending Traditional Economists, Theories and Technology Planning Considerations: A more Practical Approach to Rapid Development in Nigeria*, Referenced Monograph.
25. Ogbimi, F.E. (1991). *Managing Education – Production Linkages: Bridging the Gap between Theoretical and Practical Skills in Nigeria*, Proceedings of the Conference jointly organised by the Council for Registration of Engineers in Nigeria (COREN) and Committee of Deans of Technological Institutions (CODET), in Lagos, Nigeria, June 16 -19, pp. 22 – 32.
26. Ogbimi, F.E. (1992). *Continuing Engineering Education: Essential Linkage Programme for Rapid Technological Growth in Nigeria*, Proceedings of the 5th World Conference of the International Association of Continuing Engineering Education (IACEE), Espoo, Finland, June 2 – 5.
27. Ogbimi, F.E. (1995). *Solution to Co-Existent Mass Unemployment, Low Productivity and High Inflation*, *NJESS*, **37 (2)**: 223-251.
28. Ogbimi, F.E. (1995a). *A Critique of Nigeria's Technology Acquisition Experience 1960 – 1995: Initiating Rapid Development*, Referreed Monograph.
29. Ogbimi, F.E. (1999). *The Concept of Technological Framework and Its Relevance in Planning for Developing Nations*, Proceedings of the 1999 Annual Conference of the Nigerian Society of Engineers (NSE) in Ilorin, pp. 228 – 245.
30. Ogbimi, F.E. (2002). *Priorities in the Development of a Federal System of Government*, *NJESS*, **44(3)**: 280-293.
31. Ogbimi, F.E. (2003). *Solution to Mass Unemployment in Nigeria*, Society for Linking Education and Problem Publication, Obafemi Awolowo University, Ile- Ife.
32. Ogbimi, F.E. (2005). *Understanding Why Education and Training are Indispensable to Rapid Industrialisation and Development*, Society for Linking Education and Publication, Obafemi Awolowo University, Ile-Ife.
33. Ogbimi, F.E. and J.B. Akarakiri (1997). *Developing the Pulp and Paper Industry in Nigeria*, A Research Report prepared for NISER, Ibadan.
34. Philips, A.W. (1958). *The relation between unemployment and the rate of change of money wage rates in the United Kingdom 1861 – 1957*, *Economica*, **25** (November) : 283 – 299.
35. Pixin, F.F. and R.A. Cloward (1971). *Regulating the Poor: The Functions of Public Welfare*, Pantheon Books, New York.
36. Pritchett, L. (2000). *Understanding Patterns of Economic Growth: Searching for Hills among Plateaus, Mountains and Plains*, *The World Bank Economic Review*, **14(2)**: 221 – 250.
37. Stahl, J.P. (1990). *A New Universal Learning Curve*, Proceedings of the 1990 Annual Conference of the ASEE, in Toronto, Canada, pp. 1863 – 68.
38. Smith, A. (1976). *An inquiry into the nature and causes of the wealth of nations* (2 vols.) Printed for W. Sterhan and T. Cadwell in the Strand, London.
39. Stead, A. (1906). *Great Japan: A Study in National Efficiency*, John Lane the Bodley Head, London.
40. Stokes, J. and G. Stokes (1975). *The Peoples' Republic of China*, Ernest Ben, Ltd., London.
41. Trevelyan, G.M. (1948). *History of England*, Longmans Green Co., London.
42. Umo, J.U. (1998). *Education-Employment Connection and the Nigerian Tertiary Graduates: An Analysis of the Missing Links*, in *Bridging Tertiary Institutions and Labour Market in Nigeria*, Ebebe Ukpong (editor), National Manpower Board, Abuja, Nigeria.
43. U.S. Census Bureau (1942, 1998). *Reports of Population Census*, Washington, D.C.