



## MECHANICAL TECHNOLOGY EDUCATION FOR ECONOMIC GROWTH, DEVELOPMENT AND SOCIAL STABILITY

Mrs. Tani Yavala<sup>1</sup>, Kalus Emmanuel,O<sup>2</sup>

### Authors Details :

1. Lecturer Department of Mechanical Engineering, Taraba State Polytechnic Suntai, Jalingo Campus, Taraba State, Nigeria. +2348104695532. E-mail: [taniyavala53@gmail.com](mailto:taniyavala53@gmail.com)
2. Lecturer Department of Mechanical Engineering, Taraba State Polytechnic Suntai, Jalingo Campus, Taraba State, Nigeria. Phone: +2348067999620. E-mail: [kalusemmanuel@gmail.com](mailto:kalusemmanuel@gmail.com)

Correspondence author: [kalusemmanuel@gmail.com](mailto:kalusemmanuel@gmail.com)

### ABSTRACT

*Mechanical technology education as a branch of Technical Vocational Education and Training is geared towards preparing youths for work. It is a suitable means of tackling the socio- economic challenges currently faced by the nation with respect to dwindling revenue, social unrest and increase in unemployment rate. This work reviews the factors that determine the economic growth of any nation and the relationship between economic growth and development of people and of nations at large. It highlights mechanical technology education as a potential tool that can provide the much needed knowledge and skills for manpower development for the teeming unemployed and unemployable Nigerian youths translating to viable economic activities, less dependency on foreign expertise ,imported technologies, goods and services. This paper also considers modern practices in the field of mechanical technology, it also reviews the challenges faced by institutions in the delivery of mechanical technology education in Nigeria. Finally, summary and suggestions for effective delivery of this important field of study was made.*

**KEYWORDS:** Mechanical Technology Education, Economic Growth, Development, Socio-Economic Challenges. Unemployment rate.

## 1.0 INTRODUCTION

The impact of colonialism on Africa for decades brought about the under - development of most African states. The aim of colonialism is to exploit the physical, human, and economic resources of an area to benefit the colonizing nation. The classically conditioned literal theoretically type of education offered to Africans were geared to suit the above mentioned colonization agenda .The European industrial revolution between 1760-1840 ushered in a new process of production in place of the earlier slave-based economy. The slave trade and slavery have by this time fulfilled their basic function of providing the primitive capital for this industrial revolution. The quest for the investment of the accumulated capital and the need for raw materials led to the colonization of Africa ( Ocheni and Nwankwo, 2012). So , the type of education offered to African was aimed at helping these colonial masters achieve their agenda and not geared for self reliance as that will negate a key factor of their colonization agenda which an acquired market for their imported product. Employment creation continues to be a major challenge for sustainable development in Africa. Even with the high rates of economic growth, employment creation has been limited, especially among the youth and women. This reveals a weak correlation between economic growth and employment creation in Africa. Studies have pointed to the fact that economic growth in the last decades has been led by capital-intensive enclave such as foreign portfolio investors, with a low employment elasticity of output growth.

UNESCO and the International Labor Organization (ILO) defined Technical and Vocational Education and Training (TVET) as “aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupants in various sectors of economic and social life" (UNESCO and ILO, 2001). TVET is dispensed in public and

private educational establishments, or other forms of formal or informal instruction aimed at granting all segments of the society access to life-long learning resources.

Traditionally so-called “intellectual” work is often contrasted with “manual” work. Thus there would be, on the one hand, white-collar (office) professions and, on the other, traders, technicians, etc. Nowadays, such a distinction is no longer possible since technical education is strictly intellectual in all sense of designs and productions. Though African political institutions such as in Nigeria in particular continues to minimize technical education, that is not to say the political class is insensitive or undervalue the potential of TVET to help eradicate or reduce significantly the gross problem of unemployment /underemployment of her citizens , they’ve continued to point to the issue of how capital intensive running TVET can be. Recently with the adoption of democracy by most African Nations’, most of African leaders and governments have significant level of education to rationalize what is good with respect to the better type of education to adopt for the betterment of the livelihood of her citizens. It is unfair to say today, that any African nation is insensitive to the benefits of TVET for the self reliance of her teeming population. The political is the critical institution of state, it shapes the socio- economic institutions of any state. The will-power of decision of the political class in implementation of TVET can be the bold step for the socio-economic drive of Africa and Nigeria in particular.

The basic aim of TVET according to Porres, Wildemeersch and Simons (2014) is to prepare the youth of any nation for work, it has to do with learning and developing work related skills of any types incorporated with entrepreneurship training for effective delivery of product and services of the trainee. Skills are needed for sustainable economic development of individuals and the nation at large. Thus, vocational technical education has emerged as one of the most effective human resource development strategies that Nigeria and other developing countries need to

embrace so as to train and modernize the technical workforce for industrialization and national development (FRN, 2013).

Mechanical technology as a branch of TVET has a significant role to play in the transfer of technical knowledge and skills needed for work for Nigerian youth and Africa at large. This work is a review of such subject matter as a tool for national development.

## **2.0 SOCIO-ECONOMIC CHALLENGES OF NIGERIA**

Nigeria like any other developing nation faces some challenges in its development plans and efforts to improve the quality of life of its citizens. The critical economic issues concern the need to foster sustainable rapid economic growth that will cater for the needs of its large population and the imperative for proper integration of its domestic economy into the world economy in the face of increasing globalization. The government also recognizes that advancing good democratic governance is key to the political stability of the country. Overcoming the challenges of poverty, fighting corruption, meeting the basic needs of the people, inadequate and inefficient infrastructure and development of human resources and capital for sustainable growth and equity are critical social challenges that government is determined to address. The government also recognizes the need to maintain the sustainability of the country's environmental resources for the benefit of present and future generations. The strategic approach that is adopted to operationalize sustainable development in Nigeria centres on critical mechanisms of: Governance, Education, public awareness and capacity building, Stakeholders' participation, Information and Communication Technology (ICT) , Environmental Monitoring and Data Management, Science, technology and innovation , Research for development , Financing for sustainability; and International and regional cooperation ( FGN, 2012). All the above critical factors of development is geared towards social engineering, preparing and equipping the people

to become self reliant and good interpersonal social relationship that enhances productivity , innovations and positive engagement of citizens for peaceful and harmonious living.

However, the good intentions of government concerning the above mentioned critical factors that determines the success of any government of good intention for her people has so far in Africa and Nigeria in particular failed to deliver the so desired results. Why is Africa having such chronic issue with gross socio-economic under-delivery? The answer lies with the key missing link between good governance and social-economic or national development.

Patrick , Friday , and Ifedayo (2014) opined that historical colonial experience, autocratic rule, political instability, the monoculture nature of the national economy, and the persistent lack of commitment to focused development strategies on the part of the political elites are part of the causes of Nigeria's current status as an underdeveloped country. In addition they also mentioned the critical factor of poor governance leadership capacity delivery as the major factor.

It is also factual that there is collapse in the functions of check and balance role of each arm of democratic government in several African governments such as we have in Nigeria , where the executive do not only drive the other arms but determines which bus stop to drop them. The legislature and the judiciary seems to have been subsumed into the executive, so democracy is classically been reconditioned the autocratic rule. Weak institutions of state have also been responsible for poor delivery of public services, inadequate policing, and erratic administration. The central government and political elites have been deficient in the provision of collective goods, including infrastructure, social provisions, regulation, and public order. The absence of good democratic values that provide access and accountability to the people, gives rise to further poor governance by promoting and breeding corruption. This contributes to deepening poverty, creating a foundation for social unrest. These have undermined the legitimacy of democratic rule.

For democracy to thrive it requires strong institutions such as the legislature, courts, police, armed forces and civil service for good governance; but unfortunately many of these institutions are weak due to poor leadership and corruption; and have fostered problems of governance (Patrick , Friday , and Ifedayo , 2014). Therefore the weak political structures and poor governance leadership delivery in Nigeria is responsible for the poor socio-economic position we've found ourselves toady. Good governance should have implemented all the action plans towards adaptation or mitigation of effects of climate change which today is a major cause of socio-economic depletion of Nigeria and Africa at large culminating to all sort of social restiveness. For instance in Nigeria, migration of the Northerners to the South is likely to continue because of the challenges posed by global warming and dwindling water resources. Lake Chad, the Niger River and the Benue River are fast drying up, so more northerners in future will migrate southwards; especially cattle herdsman in search of water for pasturing. This may further escalate the tense socio-economic problems .Tribalism is another social malaise in Nigeria which has hampered economic growth. Tribalism destroys meritocracy, which is a system which rewards people for their achievement. It breeds the discontent that leads to ethno-religious clashes and inhibits the socialization of the people. Tribalism is an enemy of meritocracy which promotes competitiveness and work hard, which in turn create innovations for global economic competitiveness which brings foreign exchange earnings. Considering all the strategic approaches to be undertaking by the government of Nigeria as mentioned above for rapid development in the socio-economic sector, almost all of these approach points towards science and technology as a veritable tool to a sustainable social and economic growth. To be concise , Technical vocational education and training (TVET) is the path to take for such an achievement specifically mechanical technology education delivery.

### 3.0 UNEMPLOYMENT PROBLEMS IN NIGERIA

According to information sourced from NBS Report (2018) reports that the total population in Nigeria is divided into labour force (currently active) and non-labour force (not currently active). The labour force population covers all persons aged 15 to 64 years who are willing and able to work regardless of whether they have a job or not. The definition of unemployment therefore covers persons (aged 15–64), who during the reference period were available for work, actively seeking for work but were without work.

The non-labour force includes population below 15 or older than 64, as well as those within the economically active population i.e. 15-64, who are unable to work, not actively seeking for work or choose not to work and/or are not available for work. The report states that of the 20.9 million persons classified as unemployed as at third quarter of 2018 i.e Q3 2018 11.1 million did some form of work but for too few hours a week (under 20 hours) to be officially classified as employed while 9.7 million did absolutely nothing, of the 9.7 million unemployed that did absolutely nothing as at Q3 2018, 90.1% of them or 8.77 million were reported to be unemployed and doing nothing because they were first time job seekers and have never worked before. On the other hand, 9.9% or 0.9million of the 9.7 million that were unemployed and doing nothing at all reported they were unemployed and did nothing at all because they were previously employed but lost their jobs at some point in the past which is why they were unemployed. Also of the 9.7 million that were unemployed and did nothing at all, 35.0% or 3.4 million have been unemployed and did nothing at all for less than a year, 17.2% or 1.6 million for a year, 15.7% or 1.5 million had been unemployed and did nothing for 2 years, and the remaining 32.1% or 3.1 million unemployed persons had been unemployed doing nothing for 3 and above years. For the period under review, Q3, 2018, the unemployment rate for young

people (15-35years) declined to 29.7% in Q3, 2018 from 30.50% in Q2 2018. This was however an increase from 13.7% in Q3 2015, 19.1% in Q3 2016 and 25.5% in Q3 2017. Underemployment within the youth population (15-35 years) during the same quarter declined from 27.2% in Q3, 2017 to 25.7% in Q3, 2018. As of Q3 2018, 55.4% of young people (15-34) were either underemployed or unemployed (doing nothing) compared to 52.6% in the same period of the previous year. Comparing Nigeria's third quarter's unemployment rate with the international rates (recorded in different period), Nigeria ranks the 173rd among other countries that have published unemployment statistics. The highest unemployment rate in the world is recorded in Congo (46.1%), Bosnia and Herzegovinian (35.3%), Namibia (34.0%), and Palestine (31.7%) while the lowest are found in Qatar (0.1%), Belarus (0.3%), Cambodia (0.3%), and Niger (0.4%).

With such statistics of unemployment / underemployment rate amongst able persons in Nigeria with energy and intellect its not rocket science to predict the unfolding of social restiveness , excessive struggling for the few jobs available, therefore creating opportunities for corruption for recruiters of these job seekers. Other social vices such as increase in crime is unavoidable , cheap access and use of the unemployed as politically thugs and for religious extremism all becomes the effects of unemployment/underemployment in Nigeria. The federal government of Nigeria recently has promised and is planning to create ten million jobs annually; the administration of President Mohammadu Buhari is using such programme such as the special intervention programme such as the N- Power and many more. However, these opportunities are grossly insufficient to meet the challenges of unemployment in Nigeria.



#### **4. 0 FACTORS THAT DETERMINES THE ECONOMIC GROWTH OF NATIONS**

Defined very simply economic growth in an economy is an outward shift in a nations production possibility curve (PPC) , it is measured by the rate of increase in a country's total production output or Gross Domestic Product (GDP) or Gross National Product (GNP). The total value of all final goods and services of a country over a period of time is actually its GDP. Therefore an increase in GDP is an increase in a country's production ( Agarwal ,2019).

While we know that economic growth is the same as economic developemnt , most developed nations today started with economic growth to becoming an economically developed nation.

Also according to Agarwal (2019) most developed economies experience slower economic growth as compared to developing countries. For example, in 2016, India had a growth rate of 7.1% while the American economy was only growing at 1.6%. But at the same year in consideration India's GDP was at \$2.264 trillion against \$18.57 trillion for USA. It would be more appropriate to compare their economic growth rates during similar periods in their history. Economic growth is not the same as economic development. In the absence of adequate fiscal space to States it would be over ambitious to expect automatic translation of economic growth into economic development (Sacchidananda and Debashis , 2010). Development alleviates people from low standard of living into proper employment with suitable shelter . while economic growth does not take into account the depletion of natural resources which might lead to pollution, congestion and disease. Development however is concerned with sustainability which means meeting the needs of the present generation without jeopardizing the next generations opportunities. Economic growth should therefore better the per capital income of people and be the major source of a higher level of employment of people this is because economic growth goes hand in hand with production activities.

Nigeria as a nation is grossly blessed by nature with two key factors that determines the economic growth of any nation which are natural resources and population (labour). There is however lapses in other critical factors such as physical capital investment (infrastructure), human capital investment, technology and laws that encourages foreign direct investments .

To factor- in these other four(4) remaining critical factors two things are very crucial for that to be achieved, these are , deliberate exercise of political will-power for good governance and huge investment in TVET which is the integral result of Science, Technology, Engineering and Mathematics (STEM). The political institution of any nation is the engine of social and economic change. No matter how excellent in planning and design the social and economic institutions of any nation, if the political institution is weak in content and context it pulls down completely the social and economic institutions.

Change does not just happening factors influences change. For instance according to John (2014), China's speedy and vigorous shift to manufacturing is the fact that China's stock of technological capabilities has benefitted from importing and adapting foreign technologies of production and mastering their use. For Africa, therefore, the ability to adapt to technological changes in order to increase efficiency is important. Therefore, for African economies to remain competitive in the knowledge economy and sustain its growth, their innovation systems should be able to convert their research and development (R&D) investments and their educational capacities into industrial and export strengths in the high technology sectors. The government of Nigeria must take drastic action that is geared to economic growth that depends on human capital investment on technical vocational education and training thereby enhancing a shift from white to blue collar jobs.

To bridge the innovation divide between Africa and the world's developed knowledge

economies, mere progress will be insufficient. Rather, a path of exponential growth is necessary in order to create a knowledge based and innovation driven economy and widely enjoyed and inclusive economic advancement in Africa. Collaboration and linkages among local firms, universities, and research institutes and the worldwide R&D network of multinationals will help integrate African countries into global technology development. There are common elements and lessons these countries can draw from the Chinese growth experience. The Chinese experience taught us the importance of the role of the state, institutional reforms, domestic saving and investment, outward oriented trade policies with diversified exports towards manufacturing, public private partnership (PPP), and technological adaptation through innovation. These lessons can be used to craft growth strategies pertinent to peculiar conditions in each African country and in Nigeria in particular. In addition, Africa's sustained and inclusive economic growth will require a well functioning market, major commitment to policies and institutions that promote manufactured exports. In particular, international competitiveness in manufactures and export diversification require a set of effective institutions linking the domestic economy with world markets. Also, much more creative effort is needed to promote infrastructure investment, especially the regional type through public private partnerships (PPPs) and regional integration (John, 2014). It is important to state that that each country that is a developed nation today progressed in advancement from economic growth to economic development which midwives national development mitigating social restiveness and improving the lives of the people of any nation.

## 5.0 Mechanical Technology Education for Job Creation

Basically, technical education options offered in the Nigerian education system are auto mechanics/ automobile technology , building technology, drafting technology/technical Drawing, electrical/ electronics technology, industrial craft, metal work technology, plastics and plastic recycling technology and wood technology. Mechanical technology is an integration of automobile and metal work technology. It can be said therefore that Mechanical Technology can be divided into two broad groups of areas generally referred to as metal production and the automobile system options; each of these options are made up of several occupations that requires specialized training. In metalwork technology for instance, we have occupations like foundry or metal casting, sheet metal work, welding and fabrications, machining and steel structural works to mention a few. In the automobile options, we have panel beating and car chassis designers, motor engine block designers and production, auto-electricians and auto air conditioning works ( Elom, Naatom and Ben-Kporo , 2019).

Infact Usoro, Mathew, and Udofia (2009) opined that there are job opportunities in the auto-mechanic work such as engine cleaning, lubricating auto systems, mechanical repair job, engine tune-up, brake system service and repair, front end service job, auto electricity job, auto air conditioning job, auto body repair, auto shop management, service station management, spray painting, auto interior upholstery, chassis repair job, vulcanization, radiator repair job, crankshaft cutting, mechanic driver, engine building/service, wheel alignment and tyre balancing, auto instructing job and just recently there is the new use of On-Board Diagnosing machine which is a special field in auto work where the machine attached to the faulty car via a port diagnoses the car's fault and for identifying of the car's fault alone before repair are paid for that job alone. This helps the owner of the car to be more specific in describing the fault to a repair without just

guessing what could have been the problem. This field is gender accommodating as many female job seekers can get trained in this field and becomes self reliant and in fact employers of labour.

The metal work technology provides such jobs as machining career, welder fitting job, welding analysis, welding technician, metallurgist ,welding shop management, foundry work, welding fabrication jobs such as metal door, window and protector construction, and welding instructor.

In summation therefore, about thirty-one (31) job opportunities exist in the field of mechanical technology education. The multiplier effect of this field of study/training in job creation is also very important. It is common knowledge that on the average, it requires more than two to run a medium scale workshop. Mechanical technology education is therefore a critical field of study that has the potential to create employment opportunities for millions of the teeming unemployed African youth and Nigerian youth in particular.

## **6.0 Mechanical Technology Education Delivery challenges in Nigeria**

6.1. According to Etuk and Asukwo (2015), the challenges facing the professionalism of the teaching profession include the practice of training would-be teachers by mushroom/satellite campuses; introduction of part-time programme to the would-be teachers, recruitment of uncertified and unqualified teachers to teach in the schools among others.

6.2. Most TVET departments in our higher institutions do not have well equipped laboratories, workshops and usable infrastructures. Where these exist, they are grossly inadequate, obsolete and in a dilapidated state. Indication shows that only 40% of tertiary institutions in Nigeria have laboratories or workshop spaces for TVET programmes, the remaining 60% of other institutions do not have laboratories or workshop spaces and this affects the low quality of technology programmes in higher institutions (Dokubo, 2013)

6.3 .There is also the issue lack or inadequate professionals in curriculum design of Mechanical Technology education in Nigeria to capture and reflect key components of TVET as conventionally practiced globally.

6.4. Shortage of qualified staff is a major challenge faced by institutions running Mechanical Technology education in Nigeria. Most of the Institutions suffered lack of enough training personnel and in some cases these institutions resort to using unqualified persons’.

6.5. Mechanical Technology education is such a capital intensive field of training, lathe machines and production simulation machines are very expensive to procure. Some of these production machines are custom built on special order. Milling machines, shaping machines, power hacksaw, heavy duty welding machine, live demonstration engines, dead engines, complete car body, arc welding machines, oxy-acetylene welding equipments, spot welding machine all are very capital intensive. So funding can really be a critical challenge to the running of such a course that has sufficient opportunities to alleviate or even eradicate unemployment from Nigeria and Africa at large. According to Umunadi (2010), United Nation Educational , Scientific and Cultural Organization (UNESCO) stipulates that at least 26% of the national budget must be committed to education , the Nigeria Budget for the education sector for year 2019 is far lower than this, which is pegged at 7.05% of the total budget .

6.6 . Another challenge is lack of availability of Information and Communication technology (ICT), availability of e-library, wifi and internet availability. Technology is dynamic on a daily basis as such trainee / students’ must be currently globally compliant with international best acceptable practice.

6.7 Another issue of concern is the collaboration of these institutions running mechanical technology with the private sectors into commercial production, there seems to be a static

knowledge delivery gap at the public tertiary institution offering mechanical technology education while the private sector is advancing in Research and Design thereby being dynamic in product design while the public schools remain static , it therefore necessary for there to be public private partnership (PPP) to bridge the gap that may exist through internships , excursions and knowledge sharing to sustain some extend of balance .

## **7.0 CONCLUSION**

The challenges of Africa and Nigeria in particular is wrapped in the key issues of economic growth and economic national development , the solution lies in the use of technology such as the field of mechanical technology education to provide millions of jobs that is necessary to create massive employment for the people which is consequential in the reduction of social restiveness and idleness of the larger population of citizens, enhancing a better society and a peaceful nation, which as a result of this attract further national development through foreign direct investments and local investment also. Technological advancements have provided comfort and joy to life. Mechanical technology has a direct and vital impact on the quality of life for all citizens.

## **8.0 SUGGESTIONS**

Considering the challenges mentioned above , it will save space and time to mention that Africa and the federal government of Nigeria in particular should without delay implement all the solutions of those challenges mention above as a panacea for a better society that shall be egalitarian ,experiencing rapid growth in socio-economic development , a nation of peace and opportunities for all. Change doesn't just happen; the political institution must muster the political-will to enhance change in the social and economic institutions thereby bringing the much needed national development to Africa and Nigeria in particular.

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