



TRANSFER OF TECHNOLOGY AND NIGERIAN ECONOMIC DEVELOPMENT

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AUTHORS' CONTRIBUTIONS

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ABSTRACT

This work is concerned with the effect of transfer of technology. The features of technology are determined by the nature of the economies for which they are designed. The most significant determinants includes the level of income of the recipient country, resources availability in the country, nature of the technology in use in the society, the following are the features of technology as they determine its resources use productivity and impact on production and consumption pattern. It was observed that the actual technology in use is thus circumscribed first by the nature of world technology, there by the nature of world technology, then by the availability of this technology to the country of known techniques and finally by the choice made among those available transfer of technology means the transfer of techniques in form of raw materials, plants, equipment, and knowledge from one country to the recipient (Host) country. Transfer of technology has created lot of opportunities and even wealth for Nigeria; however, it has also been observed that transfer of technology can also have negative impact on the country.

Keywords: Technology; development; economy; transfer of technology and Nigeria.

1. INTRODUCTION

Technology all over the world play important role in the development and the growth of the economy. The effectiveness and efficiency of technology as well as the choice and availability of it and its impact varies quite considerable among economies or countries. This is partly because of the varied level of technology and partly also because of the level of development of the economy of the recipient country, there is a correlation between technology and the development of these economies. More sophisticated or advanced technology tend to be associated with developed economies, while in less developed countries like Nigeria, the level of technology is simple or less advanced.

Despite the state of any nation especially developing nations or what is known as emerging economy, no nation can stand or develop without relying on inputted technology. This could be direct or indirect. Cross fertilization of ideas either by physical mobility of labour force, literature or the more recent internet. These are way knowledge can be passed and nations develop, however, the danger in it is that a country contribution to knowledge might be swallowed up by more developed economy base on inferiority complex.

The unbalance relationship between advanced economy and emerging economy has led to the thinking of superior technology and inferior technology with regards to the source of the

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technology. This has affected how individuals respond to developments within Nigerian economy, the responds could be passive or active depending on whether technology adjust to the changes in the economy or is able to create disturbance to which the economy adjusts. It is to this effect that this paper is relevant. This work shall attempt to critically assess the impact of transfer of technology on Nigerian economy.

1.1 What is Technology?

There is no doubt that technology has changed radically. Different scholars see technology in various ways; According to Hammond [1] technology is a system of physical operations on raw materials, essentials to the production of a given output. To Carrick [2] it is the theoretical knowledge and application of research, design, development and operation of goods and services and of the necessary materials, manufacturing, equipment, production and management techniques to permit the efficient production of the goods and services.

Onu [3] Sees technology as that which involves the social and economic atmosphere within which the system application of scientific knowledge of practical tasks can take place. Arinze and Ofegbu [4] defined technology as the¹ systematic knowledge for the manufacture of a product or for the rendering of services including any integrally associated managerial and marketing techniques.

[5] Defined technology as a series of techniques which includes methods used in marketed and non-marketed activities, nature and specification of the product produce and its technique, it encompasses the organization of productive units in terms of scale and ownership, it extends to services,, manufacturing and agricultural sectors. [6] in his words described technology as often identified with knowledge about improved machinery, product and process. [7] supported Jhingan when he defined technology as identified with the hardware production - knowledge about machines and process.

The actual technology in use is thus circumscribed first by the nature of world technology, then by the nature of world technology, then by the availability of this technology to the country of known techniques and finally by the choice made among those available transfer of technology means the transfer of techniques in form of raw materials, plants, equipment, and knowledge from one country to the recipient (Host) country.

1.2 Features of Technology

The features of technology are determined by the nature of the economies for which they are designed. The most significant determinants are: level of income of the recipient country, resources availability in the country, nature of the technology in use in the society, the following are the features of technology as they determine its resources use productivity and impact on production and consumption pattern.

These features include:

1. The nature and design of the product / output.
2. The scale and organizational system for which the technology was designed.
3. Its resources use including capital intensity and labour.
4. Materials used.
5. Skills requirement.
6. Infrastructural and complementary input it requires.

1.3 Types of Transfer of Technology

[8] Listed the various types of transfer of technology as follows:

1. Initiative- where the less development countries construct plants chiefly initiating the technology of the developed countries. (DCs).
2. Contractual- where the LDCs obtains capital and know-how usually through licensing
3. Joint ventures - where foreign firms collaborate with the recipient countries and agree minority holdings in assets.
4. Subsidiaries - where foreign set up are wholly or partly owned subsidiaries with host country exercising little or influence.
5. Turn- key- project- where the whole plants is transferred along with all the different stages of production to the point of final consumption through the marketing and distribution of the final output.
6. Direct foreign investment - where the foreign firms wholly invest in the recipient country.

Construal agreement joints ventures and direct foreign investments are usually the major avenues of technological diffusion although direct foreign investment is probably the major route. [9] Contractual agreement also figure prominently in other countries as such agreements account for about 85 per cent of total foreign investment in Nigeria, 87 per cent in Korea and 66 per cent in brazil. However, these data could be overestimated as the minority foreign equity participation is also included in the agreements. Joint ventures (with minority participation) are also very common in Nigeria as they

also account s for 71 per cent of total foreign investment is Sri Lanka and 48 per cent of that investment in Columbia. Foreign direct investment (FDI) is probably the most important way to effect transfer of technology and its impact is largely felt in the manufacturing sector. From the point of view of the technology-supplying country, the recipient country, anxious to be economically independent of the DCs, prefer collaboration or joint ventures usually with minority participation in the equity capital by the foreign countries.

However, there are major problems joint ventures and collaboration regarding division of operations management and profit. Also foreign firms apply export restriction clauses more joint ventures firm than to those wholly owned by them [10]. Nor do joint ventures rely less heavily on import relative to their total needs than wholly-owned subsidiaries. Thus, whether the local equity interest gives the recipient country any more effective control is sometimes doubted.

Similarly, the technical collaboration agreements do not always offer clear advantages [11]. For instance, foreign countries in the technical collaboration agreements really adjust their production techniques in line with the Nigerian factor price ratios. It was only in joint venture where the foreign firm had an equity interest that they modify technology as to some extent. Interestingly enough, the Nigerian firms do not change the techniques either from the point of view of the donor country; lack of control in management reduced the incentive to alter technology to the economic condition of the LDCs. It could be argued that only a few LDCs have the administration skill to choose 'appropriate' technology. But this is not always true [12].

2. CHANNELS OF TECHNOLOGY TRANSFER

According to [6] there are four channels of technology transfer from, one country to another and across enterprise; these includes:

2.1 Transfer of Knowledge

The Transfer of technology takes place when knowledge about modern technologies is passed on through scientific exchange in the form of research journals, books and other published materials.

2.2 Commercial Channels

Technology is also transferred through commercial channels on bilateral basis from private firms, mostly MNCs to state owned enterprises, and subsidiaries of

MNCs operating in the LDCs this is also known as intra-firm technology transfer which is in the following forms:

1. Specialized service such as financial, managerial, engineering construction etc.
2. "project packaged" sales of technology which include raw material, machinery, equipment, spare parts, management , brand names, patents, trademarks licensing, joint ventures, wholly owned subsidiaries...
3. "process packaged" sales of technology}" which includes complete production processes or plants along with market survey, product-mix, draft, designs, technical specifications, know how, commissioning, supervision, and service of experts for training local personnel.
4. "Technology package" or "simple direct" sales of technology which include "embodied" or outright sale of machinery and equipment or consulting services (disembodied) like managerial, marketing, including access to foreign markets, and other expertise.
5. "Unpackaged" sales of technology or direct investment in the form of machinery, equipment, raw materials, processed products, commissioning designing, licensing, training, management or supervision.
6. Government channel: the transfer of technology also takes place through government channels in the form of technical assistance which is not related to the direct promotion of commercial goals. This usually in the form of providing educational and training facilities to students and personnel of the LDC's in colleges and institutions in developed countries.

Further, experts and advisors come to the LDC's to advice and train people in various fields of economic activity such as: establishing steel plants, hydroelectric projects, oil exploration, and building other infrastructure.

2.3 International Organizations

Many international organizations under the allies of the UN, the European community, the World Bank, IMF...promote the transfer of technology to the LDC's through training of their personnel, providing vocational training, conducting seminars and short-term courses, helping specialists and consultants to impact training in various fields, to' evaluate natural and economic resources, etc.

The transfer of technology through government and international organizations are mostly in the form of aid. Thus, technology is transferred from developed to

developing countries through a number of channels enumerated above. But out of them, the commercial and government channels are more popular in Nigeria. However, other channels are also adopted at various stages and situations in Nigeria.

3. IMPACTS OF TECHNOLOGY TRANSFER ON NIGERIAN ECONOMY

One of the crucial factors in promoting economic growth in Nigeria is transfer of technology. Contemporary Nigeria, like every other developing country in our digital era are better placed and therefore advantaged than non-digital era societies. Information and communication are readily available now than before. Besides, there are opportunities to choose from arrays of options.

3.1 Arguments for Technology Transfer

3.1.1 Reduction of backwardness in Nigeria

Nigeria like every other less developed countries (LDC's) are in the backward state of technology, this is reflected in Nigeria average cost of production, high capital-output ratio. This has to do with the economic backwardness of the economy; hence transfer of technology reduces technological backwardness and gives the country a push that enhances productivity and employment.

3.1.2 Increase productivities

Through transfer of technology in form of capital - intensive output level of the host or recipient country will increase in the short run, productivity of labour, and other factors of production will increase in order to reduce the unit per cost of production.

3.1.3 Correction of balance

Of Payment Disequilibrium Transfers of technology from the developed countries could ease the trade gap in Nigeria; when the transfer of technology brings capital, machinery, knowledge, and expert. It increases export and reduces import.

3.1.4 Encouragement of competition

Transfer of technology increases competition in the economy of the host country which also improve the efficiency 'in the allocation of resources, thereby making the recipient country (Nigeria) competitive in the international market. Hence; transfer of technology encourages this competition in the international market.

3.1.5 Reduction of poverty

Inequalities and Unemployment Transfer of technology can increase employment within the recipient country (Nigeria). Transfer of technology through labour- intensive technology can raise the level of income of the people which will reduce poverty and inequalities.

3.1.6 Increase the growth rate

Transfer of technology as argued by some development economist as it increases the gross domestic product (GDP) growth rate of economic growth. Hence, technology transfer is said to be an engine of growth in Nigeria.

3.1.7 Filling of technological gaps

There is existence of a wide technological gap between the indigenous stock of technology and the state required technology for faster growth in Nigeria; Transfer of technology can bridge this gap in Nigeria.

3.1.8 Transfer of entrepreneurship skill

Transfer of technology from advanced countries can aid Nigeria to transfer knowledge skills needed to build the economy, thereby reducing the skill constraint in Nigeria.

3.1.9 Development of new industries

The natural resources of Nigeria lie dormant remain underutilized, unutilized or misused, transfer of technology aid Nigeria to trap its natural resources, established new industries and establishment of infrastructure.

3.2 Argument against Technology Transfer

It has multiplier effect on Nigeria economy as these arise both from the suppliers and the demand side of technology. On the supply side, the technological market are mostly imperfect and occupied by the multinational corporations (MNCS) while on the demand side, the purchasers, of the technologies have weak bargaining power due to backwardness, urgency, of importing technologies causing the suppliers to exploit the purchasers; transfer of technology has negative effect on Nigeria economy.

3.2.1 High cost

The sellers of the technology prefer selling technologies in a project packages "(technologies tied to specific projects or outputs). The buyers are compared to buy them including the purchase of its raw materials, spare parts, services of the' foreign

owners of such technologies at cost higher than the prevailing international market price. The MNCs manipulate prices as most cases they set up subsidiaries in Nigeria; Repeated breakdowns and constant repairs of out dated technology sent to Nigeria leads to high cost involvement.

3.2.2 High technology dependencies

Nigeria depends so much on foreign technology as everything of the “white man” is the best. If it is not made in “Oyibo” foreign they will not purchase. Nigeria prefers using foreign goods and services rather than using made in Nigeria. We prefer wearing “I LOVE USA” nobody wants to use “I LOVE Nigeria” to list but a few.

3.2.3 Exploitation of recipient labour

The most labour are referred to as unskilled labour in their land while the “white” are termed expatriate. The Nigerian labourers, work for longer hours with poor wages while their foreign "white" are paid with hard currency with less working hours. These workers are exposed to dangers and professional diseases which will reduce the workers life span. There are large wage differentials between workers of Nigeria and the whites, even in Nigeria. It is most painful, especially when the so called expatriates are less experience and productive to their African colleagues.

3.2.4 Politics of international transfer

The foreign firm insist in the use of donor countries expatriates, spare parts, raw materials, repatriation of large percentage of profit, high royalties for the use of patented technology, high wages (in hard currency) for the expertise. Take a look at this. A friend gave you N500,000 as loan, he asked of a good lunch, accommodation, helping you to source worker to work on the project all from the source (N500,000) borrowed from you; creating exploitative mechanism in the system which has a negative impact on the economic state of Nigeria. »

3.2.5 Capital intensive technology

Most technology transfer are capital- intensive technology from the developed countries which has limited labour absorption and cannot solve the unemployment problem in Nigeria as ,most skilled required for these capital - intensive technologies are coming from the patent countries.

3.2.6 Worsen Nigeria balance of payment

As a result of politics international transfer, repatriation of large sum of profit royalties and fees to the supplier’s countries, these worsen Nigeria balance

of payment after the initial period of inflow of capital is over. If the technology transfer is in form of direct investment type, the payment includes its principle amount and the interest, which will lead to increase in Nigeria public debt therefore worsening the balance of payment of Nigeria.

3.2.7 Out-dated technology

It is assumed that about 90% of technology transfers to Nigeria are out dated and obsolete. The supply countries will not sell modern technology to Nigeria so that Nigeria will not be equivalent in technology pace with the advanced countries. Nigeria also prefers cheap and low capital intensity technology. The cases of typewriter, black and white television, gas turbine plants to mention but a few. Nigeria is likened to a maid whose Christmas clothes are those ones used by the real “sons and daughters” of the house only during Christmas seasons these clothes amended and given to the maid as charismas wears while the sons and daughters are wearing new clothes. What the whites has used and dumped is what is “best” for Nigerian, we celebrate and value the out dated technology, so long as it is coming from the developed nations.

3.2.8 Low productive capacity

As a result of obsolete technology, the volume of production is low, man hour wasted and the net profit to the economy will be minimal. Due to depreciation (wear and tear) these technologies life span and capacity will be low. In most cases some of the spare parts are no longer available even in the international market or in the supplier countries, such technologies become useless, waste and abandoned.

3.2.9 Dangerous to health

Most Out dated technologies from the foreign countries .are dangerous to health of Nigerians such .as the release of carbon monoxide to the air, destruction of aquatic live, air, noise and water pollution.

3.2.10 Destruction of the environment

Most technology transfer are inappropriate, far from promoting competition, the ozone layer has been destroyed, our books in the libraries has changed colours, zincs changed, the ecological zones in Nigeria has been destroyed.

4. CONCLUSIONS

Technology designed for modern countries tend to produce high income products, requires high level of

education and skills, be of a large scale and require sophisticated managerial techniques be association with high level of labour productivity be linked through inputs and outputs with the rest of the advanced technology system. If these technology are transferred to Nigeria unmodified the result will be concentration of resources and infrastructure on a small part of the Nigeria economy. Income will tends to be concentrated in this area leading to market for high - income products the system produces.

Resource will be underutilized including raw materials as well as labour. From the above discussion you can agree with us that technology transfer to Nigeria has impact on the Nigeria economy. It has a mixed blessing on the economy, though its negative impacts outweigh the positive impacts. We can conclude that technology transfer is a curse rather than a blessing Nigeria economy.

5. RECOMMENDATION/SOLUTIONS

In an ideal world, if all the governments of less developed countries (LDCs) could get together and see the dangers of transfer -pricing and the multiplier effects of these transfer of technology. Unfortunately such recommendation is hardly applicable in the real world. Hence, in an imperfect world like Nigeria, fellow distinguished members of the academia, we recommend some best solutions in the following ways:

1. Government of Nigeria could take necessary measures to increase the counter railing power of the indigenous firms through mixed policies - Momentary and Fiscal policies.
2. Government should encourage research and development by channelling most resources towards promotion of appropriate indigenous technology.
3. Promotion of imported - technology substitution in Nigeria by the government.
4. The government of Nigeria should induced the MNCs to participate in training local labour in Nigeria, local participation in management of MNCs and foreign training of Nigeria to be equivalent to the foreign expertise.
5. Greater information should be spread regarding the availability technology to Nigeria government.
6. Government should reduce the promotion of the purchase of out dated technology to meet up with present and most recent technological advancement.
7. Nigeria as a surplus labour oriented - country should try to alter the existing factor price ratio between wages and interest rate m a manner

which would reflect the real opportunity costs of imports as capital are under-priced which is evidenced in low interest' and wages are overpriced (given high unemployment) there is need for increasing interest rate and providing wages and subsidies. Labour intensive technology should be encouraged.

8. The Recipient Country should try to obtain different items of technology separately rather than in a "packaged" such unpackaged technology will tend to reduce the exploitation element in the transfer - price mechanism.
9. Nigeria Government should import technology which is easy to learn, diffuse and assimilate in keeping with other factor endowment and technology capabilities (The capacity to produce more output efficiently).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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