

Appropriate Technology and Economic Development of the Emerging Nations

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Abstract - The appropriateness of the adoption and use of technology by the developing economies of the world has been emerging as an important issue at the international level with no appreciable change in the state of affairs. However, this state has been changing due to the innovative ways in which the same technology is put to use resulting in products that have found easy acceptance amongst the users. This development questions the premises on which appropriateness of a particular technology is judged. This paper is an attempt towards the re-evaluation of the existing literature on appropriate technology and also to discuss its role in attaining the development goals in the emerging nations. From various research and experiments it has been found that a particular technology becomes appropriate when it finds its acceptance in the emerging nations. Again, only those technologies gather acceptance which has the potential for enhancing the economic, cultural and environmental prospects of the emerging countries. Thus, the ultimate conclusion of the paper tries to make the people aware of the fact that it is through the adoption of appropriate technology (A. T.), the emerging nations like India can achieve the expected development goals with the help of secondary sources of data.

Key Words: Appropriate technology, Emerging nations, Economic development

1. INTRODUCTION

The word 'technology' has been derived from a combination of two Greek words 'Techne' which means 'art, craft' and 'Logos' which means 'word, speech'. In the words of economics, technology can be defined as the innovative ideas or knowledge that helps us to produce output from inputs. According to the Author, Maynard Webb, "Technology and application of this technology will continue to improve and evolve, providing unprecedented, global access to information, individuals, training and opportunities." Technology can be regarded as the key element for any economy to achieve the heights of economic development. This paper chooses appropriate technology as the main theme because it is a specific kind of innovation that can play vastly an increasing role in the emerging world, such as China, India, etc. Appropriate technology emphasizes the important role of demand side factors in inducing innovations.

2. Review of the Literature

The technological movement from the developed world to the emerging economies has been started after the advent of globalization. This ultimately led to industrialization of the emerging world in a different way, whereby the emerging nations became the mere producers of those goods which were earlier produced mainly in the developed or industrialized nations. Thus the state of technological movement ultimately led to the state of dual economy (situation in which rich became richer and poor became poorer) and the emergence of dual economy raises the need for appropriate technology.

Considering the development process of the emerging nations, Schumacher (1989) stated that a problem of dual economy has emerged in all the emerging economies as a result of the adoption and use of the technologies which are basically imported from the developed nations. Schumacher in 1993 further propounded the concept of intermediate technology which is neither the indigenous technology nor the highly capital-intensive technology.

The concept of appropriate technology is defined as the technology which is appropriate to the environmental, cultural and economic situation it is intended for. It is the one that takes into account the technical, financial, environmental, and institutional and community factors in to consideration. But it may not be cheap and suitable for the developing or emerging nations (Strategy 2008).

In the context of appropriate technology and the economic development of emerging nations, Narayana (2003) argued that particularly the emerging nations should go for adopting those technologies which can help the human resource to become more productive, instead of making them redundant. Besides this he also stated that appropriate technology should have the capability to fulfill the conditions of affordability, accessibility and appropriate.

Jequier (1978) pointed out that inappropriateness or appropriateness is a quality which can be engineered in to particular technology. He further argued that appropriateness of any technology lies less in specific design features of particular piece of hardware than in the broadness of the evaluation criteria which underlie its development and application.

Akubue (2000) referring to the U. S Agency for International Development (USAID) 1976 proposal to the U. S Congress said that the use of capital-intensive technology has contributed to the development of dual economies consisting of a small percentage of well paid workers with a large percentage of workers poorly paid and experiencing stagnation. This dual economy resulted in increasing migration of people of cities, who continued to live in pathetic conditions. Jequier (1979) as quoted by a Akubue (2000) stated that modern technologies and appropriate technologies are complementary to each other and are not contradictory. This is especially true in the globalised world, where there is a need for those two technologies to coexist and prosper together.

3. Objectives of the Study

The paper is mainly based on the following three objectives-

1. To examine and evaluate the meaning of appropriate technology.
2. To relate the concept of appropriate technology with the emerging nations in the context of economic development.
3. To signify the importance of appropriateness of technology for attaining economic development of the emerging nations

4. Methodology

The data required for the entire study are collected mainly from secondary sources. The secondary data are collected from various published sources like magazines, newspapers, journals, books and various publications. Besides these sources, some important information is also collected from relevant websites. The present study is descriptive in nature.

5. Appropriate Technology

Appropriate technology is an ideological movement and its manifestations, encompassing technological choice and its application on small scale, decentralized, labour-intensive, and energy efficient, environment friendly and locally autonomous bodies. It was originally articulated as intermediate technology by the famous economist Dr Ernst Friedrich Schumacher in his well-known work, "Small is Beautiful". The concept of appropriate technology is often defined as the technology which is appropriate for the environmental, cultural and economic status of the nation. Thus, appropriate technology can be interpreted as that type of technology which uses small amount of resources and which involves less cost in its implementation and which has less impact on the environment.

Appropriate technology was basically meant to address four central problems, such as, extreme poverty, starvation, unemployment and urban migration. In 1983 the OECD defined appropriate technology characterized by "low

investment cost per Workplace, low capital investment per unit of output, organizational simplicity, high adaptability to a particular social or cultural environment, sparing use of natural resources, low cost of final product or high potential for employment". Appropriate technology often serves as an umbrella term for a variety of names for this type of technology. It mainly focuses on that technology which is more productive and beneficial than that of the traditional one but less costly than the technology of industrialized societies. The types of technology included under appropriate technology are capital-saving, labour-intensive, self-help, indigenous, adoptive technology, etc. The definition of appropriate technology has been debated since Schumacher (1973). One critique of the appropriate technology movement is that designed for poverty issues, it is not driven by a profitable and sustainable business model. Therefore, the challenge is to align the concept of appropriate technology with the broader perspectives of innovation theory to create more flexible innovative solutions. In response to this argument this study examines how to design and develop appropriate technologies that meet the specific requirements of emerging markets.

6. Appropriate Technology and Emerging Nations

6.1. Innovation for Emerging Markets: -

Scholars and researchers mostly argue that markets of emerging economies provide important growth opportunities to firms. Again, the unique characteristics of emerging markets pose challenges for firms. In these emerging nations a huge section of the society belong to the low-income group which is popularly known as the "People at the Bottom of the Pyramid (BoP)" as mentioned in the book "The Fortune at the Bottom of the Pyramid (2002)" and due to which there arises the problem of income disparity. The consumers of the BoP markets are greatly price sensitive and with skills too low to the products with complicated functionalities. In the emerging nations, the service and repair are not readily available and due to infrastructural deficiencies, products for such markets need to be robust to harsh environment and products suitable for such a context need to be maintainable at the local level.

Again, there are various constraints associated with the emerging nations which used to affect the type of technology appropriate for such markets including financial constraints, lack of infrastructural facilities and inadequacy of knowledge, skill and insufficient information. Because of the existence of these barriers the products and services need to be redesigned to meet the specific requirements of emerging markets and thus the firms need to build the entire business from scratch.

Schumacher realized that the technology developed by the high-income nations was inappropriate for low income countries and thus, he advocated appropriate technology which is expected to be compatible with the low income

emerging nations. Again, this type of technology has been criticized for decades. Some scholars and researchers argued that appropriate technology movement consigns poor countries to a state of perennial under development whereby the section of society with low income becomes locked in to the use of unproductive and inefficient technology.

Some other scholars also suggested a broadened notion of appropriateness whereby new technology must be compatible with not only the income level of the local consumers but also the resources available in that emerging market. Again, there are some practical implications of appropriate technology, which include it enhances the local people to use the technology which again accelerates capacity development and knowledge accumulation. Thus, in exact words, we can say that appropriate technology leads to the development of new type of technology which can easily be applied in the emerging nations.

6.2. Disruptive Innovation: -

Disruptive innovation is a term in the field of business administration which refers to an innovation that creates a new market and value network and eventually disrupts an existing market, displacing established market leading firms, products and alliances. Though the products produced through disruptive technology are inferior to the one already existing in the market yet it provides some other benefits, like, they are relatively cheaper, simpler, smaller and often more convenient. These innovations first benefit the poorer and less-skilled section of the society and eventually with improvements in performance it can disrupt mainstream markets. By using, under-served markets as the testing ground for refining disruptive innovations and gradually improving their performance. Such firms may also be able to attack main-stream markets.

Emerging economies can provide a great opportunity for disruptive innovation because in these economies new customers with new needs can be served with new technologies. As the emerging nations are greatly characterized by huge population, firms are able to realize growth opportunities by creating disruptive technologies because such technologies are easily accessible, affordable and also compatible with users knowledge and skills. Thus, such type of innovations provides a feasible way for firms to craft appropriate technology for emerging nations. As this is a completely new subject matter, that's why we need more research on innovation processes suitable for emerging nations including not only the design of new product properties but also the building of supply system compatible with the socio-economic context.

7. Appropriate Technology And Economic Development of Emerging Nations:-

The economic development of not only the emerging nations but also of the well developed industrialized nations depends greatly on the technology they adopt for the production of economic resources or technologies that facilitate learning. But it is of great importance for the emerging nations because technology acts as the back-bone towards achieving the developmental goals. Technology and economic development are so intertwined that the government administrators and politicians also continued to believe that it is the lack of technology, which is responsible for low rates of economic growth and the subsequent poverty that prevails in the world. Ranis (2011) stated that "Human development in combination with technology, yields economic development, which in turn, is necessary to generate further advances in human development."

The concept of appropriate technology basically denotes a set of ideas or a framework within which we are to think and act for the development of the society. The main aim of this idea is to provide a basic and a method for the choice of technology. This movement has led sociologists, economists, philosophers, technologists, planners and environmentalists to contribute towards its definitive descriptions. It is directly related to the main developmental issues such as unemployment, poverty, population growth, rising inequality in society, urbanization, environmental pollution and ecological degradation, etc. in many ways. Thus, it endeavors to eliminate the adverse effects of modern technology by devising the same to retain its organic link between man and nature and to sustain growth by making units as small as possible. This concept is also closure to the operation of small scale industries. It advocates for smaller technologies dispersed in various areas with a bias against sophisticated large scale capital-intensive technologies. This concept can be used in terms of engineering designs and constancy groups that have the necessary socio-economic-cum-engineering expertise and have familiarity with the situation of the nation. Thus, it can be said that appropriate technology is a set of diverse and engaging explorations of the linkages between the technological choices and social values. Thus, appropriate technology is a term which is associated with environmental and climatic suitability, capital or labour-intensiveness, use of local resources, energy saving character and resources intensive character of technology.

In the past, appropriate technology concept was generally used in the context of developing countries. But, later on, with the passage of time, it has gathered importance in both developing and developed countries. Originally, it has emerged in response to employment generation and poverty elimination in the emerging nations but large number of emerging nations today adopted heavy industrialization path to achieve the path of economic development in a shorter span of time and the technologies they adopt don't

necessarily reflect local factor endowments and their socio-economic relevance in these countries. On the contrary, developed countries are now mainly concerned about green and energy saving technologies under the rubric of appropriate technology.

In case of developing or emerging economies, the main problems which they face till date are mass poverty and illiteracy. Because of these two problems, these countries are not in a position to adopt and implement the new and advanced technologies which are technically efficient. Thereby the use of appropriate technology is much more beneficial to achieve the expected or required development which makes use of the resources and labour at a very low level of expenditure. Appropriate technology is the technology which selects or develops methods which are compatible to local economies and which are intermediate in costs and their sophistication being placed between simple and complex technologies

The process of replicating the economic development model of the industrialization based on technology transfer could not succeed in emerging nations, even though various international organizations like United Nations Conference on Trade and Development (UNCTAD) have been making efforts to ease technology transfer and the position impact of globalization on technology transfer. Because the technologies of the developed nations are mainly formulated keeping in view the environmental factors prevailing in these countries and thus, ultimately these technologies aren't perfectly suitable for the emerging nations. Thus, appropriate technology is required because it takes into account the socio-economic, cultural and environmental situation of the nation, where it is intended to be used. And thus, in such a situation an emerging nation can easily adopt and implement these technologies and also get the benefits that can be obtained from these technologies.

8. Conclusions

Our study is basically an attempt towards making people aware about appropriate technology and also to create a concern about the use and implementation of the appropriate technology in the emerging nations. Our study represents an attempt to explore how to develop and diffuse appropriate technology in emerging nations. This study suggests that for developing and diffusing appropriate technology in emerging markets mainly requires the following initiatives -

1. Radically redefining the identity of technology in terms of both functions and technical structure to meet local needs.
2. Simplifying the product technology through modularized designed to enable a low-cost production mode.

REFERENCES

1. Akubue, A. (2000) "Appropriate Technology for Socio-economic Development in Third World Countries ", The Journal of Technology Studies 26:1, pp. 33-43 (online) (cited 9 March 2013) Available from URL <:http://scholar.lib.vt.edu/ejournal/JoTs/Winter-Spring-2000/akubue.html>Appropriate Technology in the Age of Renewable (online) (cited on 3 March 2013). Available from <URL:http://www.ncsu.edu/bioresources/BioRes_02/BioRes_02_2_146_147_Hubbe_AppropriateTechnology.pdf>
2. Daudpota, Q. I. (2001), "Intermediate Technology - an appropriate developmental path" (online)(cited6March2013).Availablefrom<URL:http://www.sciencevision.org.pk/BlackIssue/Vol7No1-2/Vol7No1&2_9_Intermediate_Technology_IsaDaudpota.pdf >.
3. Musunuri, D. (2014), "Appropriate Technology and Economic Development of Emerging Economies - A Myth or a Reality" Journal of Technology Management for Growing Economics. Vol.5 No.1 April 2014, pp. 51-62.
4. Narayana, N. (2003), "Making Technology for the Poor in Developing Countries " Botswana Journal of African Studies, 17:2 , pp. 26-34.
5. Prahalad, C. K.; Hart, S. L., "The Fortune at the Bottom of the Pyramid ", Strategy Bus 2002, 26, 54-57.
6. Ranis, G. (2011), "Technology and Human Development" (Online) (cited 6 March 2013). Available from <URL:http://www.econ.yale.edu/growth_pdf/cdp1004.pdf>.
7. Schumacher, E. F. (1989), "Small is Beautiful Economics as if people mattered", London, HarperPerennial, a division of Harper Collins Publishers.
8. Schumacher, E. F. (1993), "Small is Beautiful Economics as if People Mattered", London, Vintage Books.
9. Strategy (2008), "Appropriate Technologies in the Water Sector in the South Africa ", Position paper at Strategy, 8 May (online) (cited 6 March 2013). Available from <URL:http://www.dwaf.gov.za/Masibambane/documents/ATStrategyMay08.pdf>.
10. "Transfer of Technology" (2001), United Nations Conference on Trade and Development, (online) (cited 12 March 2013).
11. Zhou, Ji; Jiao, H.; Li, J (2017), "Providing Appropriate Technology for Emerging Markets: Case Study on China's Solar Thermal Industry ", MDPI, Received: 6 November 2016; Accepted: 16 January 2017; Published: 25 January 2017.

BIOGRAPHIES



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