



The impact of cultural dimensions on technology transfer in developing countries

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Received 17 August 2005, accepted 2 November 2005.

Abstract

Food shortages, pollution of air and water, soil erosion and rapid industrialization are but a few of the many problems facing mankind. Abuse of earth's lands, accompanied by un-programmed world's population growth, has put unmanageable pressure on natural resources. Technology transfer is facing enormous challenges in dealing with all these problems. The need for new technology transfer approaches arises from the new demands imposed by the huge population increase and the new concept of sustainable development.

Strengthening technology transfer institutions, enhancing participation, as well as improving resource management, would reinforce sustainable development by balancing the three major components: environment and social and economic factors. The future of technology transfer would depend largely on its capacity to implement economic, social and environmental policies that would create the basis for sustainable development.

Technology transfer contributes to long-term sustained agriculture only if there is an active interaction between individuals, societies and communities. In any interaction between them, there is an element of culture and ignoring any of them while promoting technology transfer may produce unwanted results. Therefore, there is an urgent need to know what technology is needed, when and how it should be transferred and who should adopt it.

This article provides an overview of the social dimensions of technology transfer and the impact of each component on the process. Some benefits of technology transfer and its role in the economy as well as soft and hard technology are examined. The relationship between vertical and horizontal technology transfer are presented. Factors affecting technology transfer are also discussed.

Key words: Vertical and horizontal technology transfer, environmental, economic, political, human and regulatory factors.

Introduction

The world population is facing enormous economic, social and environmental problems, due to rapid population growth. Three people every second - over a quarter of a million every day, a billion people - a whole extra China - will be added over the decade¹². Over 11 billion people⁵ will share the existing limited natural resources, 90% of which will take place in developing countries⁶.

Technology must play a vital role in balancing the global food demand and supply as well as addressing the problem in a comprehensive way to produce sufficient food in an environmentally sustainable way. Enormous efforts in education, training and other services have become a serious challenge that all countries must face.

Social factors can play a vital role in speeding or slowing technology transfer. Certainly, understanding social problems can affect the rate of adoption of new technologies, and recognizing socio-cultural as well as economic aspects can improve the knowledge basis, participation level, as well as management skill of people³. No doubt that technology transfer can improve the economy, create job opportunities, reduce crime and improve living standards. The more a nation is open to the world, the faster technology transfer will go. It is unable to penetrate and make needed changes if nations close their borders. Certainly, when people find the latest technologies at their front door, they become more aware, better educated and more career-oriented. As a result, the family size decreases thus reducing

over-population pressure, and certainly moderate impact on the environment will be created.

The Problem

The total knowledge of mankind has doubled by the end of the 20th century. The number of data banks has jumped from 300 to over 4000 during 1980-1990, while the number of scientific publications published per year has jumped from 10,000 in 1990 to over 100,000 in 1999⁷. Knowledge is generating at a rate that mankind is incapable of mastering it and making it applicable and socially acceptable. The magnitude of today's problems is immense where the large increase in technology transfer activities around the world has led to unmet demands for trained staff. The world had already much more technologies than we need and there are no established mechanisms to transfer them from labs to industry and real life⁸.

A major factor limiting the acceptance of new technologies is lack of understanding of socio-cultural attitudes, norms and values. Acknowledging variations between them is the first requirement for a faster technology transfer. Many argued that if socio-cultural factors and characteristics do not match the new technology, they pose greater threat to economic prosperity and may destroy traditional social attitudes and values.

Vertical vs. Horizontal

Technology transfer can be defined as the dissemination of

scientific knowledge resulted from research to end-users for a potentially useful purpose often for exploitation. Its scale may vary from the elementary to the most advanced technology. It is very important to note that technology transfer and technology 'make-up' is completely two different meanings and should not be confused. In its broadest sense, the first is used when discussing the movement of new technologies from advanced well developed countries to Third World Countries as a set of new modernized practices. The latter means acquiring already exploited technology, usually by purchasing it.

When the meaning was first used, it was restricted to the transformation of research results and development in basic sciences into commercial technologies. This movement is called vertical technology transfer, while technology movement from developed countries to third world countries is known universally as horizontal technology transfer. It includes both practices and processes in soft and hard expressions. The soft covers capacity building, information networks, training and research, while the hard includes equipment and transport.

Cultural Dimensions

Nobody argues that a continuous process of social and cultural change always accompanies the slightest technology improvement. The issue that deserves fuller attention is the various aspects of human factors associated with adoption of new technologies because it is not simply a new product, machine or a patent, but a package of knowledge, a broad set or group of processes and sequential practices. No doubt that the degree of adoption and acceptability of new technologies lies in the user's physical, environmental and cognitive capacities¹.

Among the important questions is the impact of technology transfer on existing social and cultural process¹¹, local and indigenous cultures, social organizations, values, customs and language. In Jordan, the Bedouins' life was totally affected by new technologies. Many tribes have settled in small apartments provided by the government with access to electricity and tap water. In Syria desert settlers depend largely on pickup trucks for their movements. Camels are not used anymore. Many realized that using transportation vehicle is faster and more efficient. Now, pickup trucks are parked outside their tents. The same case applies to many desert settlers in African countries, where the visitor sees TV sets and cooking ovens. Many conservative families in Jordan, Saudi Arabia and other Islamic countries prohibited the use of satellite dishes because they fear of eroding their culture. In Egypt, for example, thousands of desert settlers have switched to cooking ovens instead of burning sticks. The Egyptian government has made them cheaper and provided discounts on gas containers to conserve agro-biodiversity from deterioration after many species were extinct.

Another significant factor would be the successful partnership with research and development between countries of the north and the south. A vital component of technology transfer process is the management of successful, long-term relationship between research institutions and the commercial body. Technology transfer must maintain close ties with research to best serve the needs of technology seekers.

A critical factor in the process of technology transfer is the effective investment in education and services. It contributes directly to national wealth through increased production,

enhanced food security and increased technical and management skills. It should be emphasized that in the early development process, technology transfer must emphasize not only on essential technical and managerial skills, but also on organizational and leadership skills as well.

Factors affecting technology transfer can be grouped in six categories: economic, social, environmental, political, human and regulatory factors. It is impossible to indicate the most or the least important one since none is more or less important than the other.

Among important economic factors comes the availability of funds needed to learn, disseminate and adopt new technologies. Developed countries can get new technologies faster than developing countries. Buying knowledge and technical knowledge, new devices, machines and expertise as well as training of people can be achieved faster. On the other hand, many developing countries, which suffered starvation during the 90's, were unable to buy food, and new technology was even impossible even though they knew that it helps increase productivity, create more industrial opportunities, enhance quality of life, improve economic growth and become a base for stronger economy and competitive industry. Therefore, the gap between poor and rich countries will stay wider due to the fact that new technologies that can be afforded by developed countries can generate more money, jobs and better services. In contrast, developing countries will face higher unemployment rates, less income, crime and other social problems. Free trade zones have become a necessity between countries. That's why Jordan created three free zones at the borders with Syria, Saudi Arabia and Iraq.

Political stability is a must in effective technology transfer. Political stability can enhance technology transfer through better educational systems, knowledge and health services. No country in the world can benefit from technology if it is unstable. Both are parallel in the development process. Countries suffering from instability get no investments because of high risk. In Afghanistan, for an example, due to civil war, the country will suffer for many years to come.

Human factors are not less important and are the main cornerstones of technology transfer structure. They include human resources, technical management, training and regulatory skills. These are the main streams that help the flow of international capital where levels of foreign investment can increase greatly depending on economic infrastructure and the skills available in a society. Certainly, it creates a better foundation for future services, exchange of ideas, thoughts and expertise.

Regulatory measures are the fifth important column holding the technology transfer process. Well-enforced regulations in addition to taxes and removal of subsidies can provide the basis for technology transfer. Property rights and absence of proper laws can affect investment. Innovations can be fostered if intellectual property rights are respected.

In order for technology to cross borders, it must overcome determinants or obstacles. Language plays an important role in speeding or slowing of diffusion. Many countries seek new ways and better technologies to make their economy more effective and improve living standards. Rapid diffusion will be facilitated by the willingness of individuals to make changes or adjustments. Certainly, adoption of new technologies by individuals,

organizations or governments will depend largely on its economic rational. The higher the benefits are, the faster adoption will go.

Conclusions

The greatest challenge facing technology transfer is social and cultural norms. Technology transfer should be planned carefully and the interests of technology providers and users must be balanced in such a way to ensure technology development. The use of new technologies must ensure participation by a wide range of partners. Social values vary from one community to another depending on environmental, economic, political, human and regulatory factors. It is impossible to purchase technology as a product or a gadget without taking into consideration all these factors.

Effective partnership is a must between research centers and intermediaries who serve as a connection link with technology seekers. Many of the impediments to successful technology transfer can be removed by involving governmental institutions and NGOs. Both can enhance research labs and help establish effective and competitive economy.

In order for technology transfer to be successful it must meet local needs and priorities as well as willingness of people. Technology transfer can be successful, as Mwangi⁹ put it, if learning needs, problems, priorities, as well as psychological process and semantic, physical and economic barriers are understood.

Finally, there is no doubt that technology transfer can and definitely will help solve many problems. The reliance on technology transfer should be accompanied by generous funds spent on research and development, facilitate its findings to the general public without ignoring social and cultural differences. No doubt that tomorrow's technologies are the result of today's choices. It is worth noting that if technology is responsible for causing problems, it is also technology that can also fix that problem¹⁰.

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