

A New Model for Overcoming Technology Transfer Barriers in Iranian Health System

Hamidreza Salmani Mojaveri, Hamid Eslami Nosratabadi, and Hossein Farzad

Abstract—Technology transfer barriers have been existed and discussed in several sections in developing countries such as Iran for years, but this is commonly misunderstood and difficult to apply technology transfer in this countries. The aim of this paper is to designate a new model for overcoming technology transfer barriers in Iranian health system by means of reviewing structure and performance of this system. Also few key barriers are given in this paper that exists in Iranian health system.

Index Terms—Technology Transfer Barriers, Iranian Health System, Technology Transfer Officer.

I. INTRODUCTION

Technology transfer and its role in the development of technological capabilities were discussed widely during the last quarter of the twentieth century [1]. In addition, Technology transfer has been defined as: The process of movement or transfer of information, technical know-how, and people among corporate technical functions such as R&D, engineering, manufacturing and nontechnical functions such as sales in order to yield innovative products and services that meet corporate business goals and fulfill customer needs[1].Technology transfer takes on even greater importance for Productivity growth in developing countries, which as a group undertake little domestic R&D and therefore have few domestic sources of new technology[1]. Countries also prefer to be distinctive in the efficiency of using technologies [2]. As Blomstrom et al [3] indicated, one might suppose that the rate of economic growth of a backward country would depend on the extent of technology transfers from the leading countries and the efficiency which they absorbed and diffused. With regard to the efficiency of technology absorption, Griffith et al. (2004) [4], Kneller and Stevens (2006) [5] have found important Variables such as human capital, social institutions and international trade. Technology transfer is a subset of the innovation process, namely: Identify appropriate technology, Evaluate technology, secure technology, Protect technology, Produce prototype and develop product, obtain technology-awareness training and organized product-specific training. In some researches [6,7] barriers divided effective technology

transfer into two types: technical and attitudinal. In addition cultural barriers have been defined by Deal and Kennedy (1982), Harrison and Stokes (1991) [6]. Another barrier has been introduced after these barriers called market barrier [7].

II. BARRIERS

A. Technical barriers:

It has been found that it is impossible to transfer technology effectively without “people transfer “, through inter organizational secondments.

This facilitates understanding, assists in the development of staff, and fosters organizational commitment by overcoming the “not invented here” syndrome that can occur when technologies are introduced from external sources. Additionally, the process of scaling-up product output to the prototype level and beyond almost invariably involves technical design and performance changes. This process can generate “pride of ownership “disputes between R&D staff and production managers.

B. Attitudinal Barriers:

There are significant differences in the attitudes of personnel toward time. These fundamental differences in attitudes and values help to define, the basic conflict that exists between the management of innovation and strategic business management. This conflict may inhabit communication between the various groups involved in technology transfer and reduce the likelihood of a successful outcome if not acknowledged and addressed.

C. Cultural Barriers:

It is important to note that differences in Organizational culture have a strong impact on organizational effectiveness. Therefore an organization’s culture which is omnipresent needs to be understood. This effectiveness is also considered to relate to both the diffusion and management of technology transfer [7]. The types listed in Table 1 are considered useful in formulating the basis of the Analysis of an organization’s culture.

It is therefore evident that the culture of an organization either facilitates or hinders the process of technology transfer

TABLE 1: TYPES OF CULTURE

Types of culture	Its focus
The work-hard culture	Staff take few risks
The bet-your company culture	Big- stake decision are taken
The process culture	Concentration is on work
The tough-guy culture	Individualistic culture leader
The power culture	Strong but fair and generous
The role culture	Rule of low and fairness
The achievement culture	Job-satisfaction
The support culture	Mutual care and support

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from external contacts; that is,

(1) If the recipient's organization culture is an "open" culture, then the transfer will be largely a function of the degree to which donors "let go" technology;

(2) However, in a situation where the local culture of an organization is less willing to open, the transfer would then be a function of the following elements:

- The degree of willingness of the donors to proceed with the transfer;
- The extent to which the local culture is hostile to the external culture associated with the transfer;
- The ability as well as the degree of either culture to integrate with each other. [6]

Kedia and Bhagat reported that cultural differences between the transferor and transferee, often referred as gaps, are seen to be one of the organizational communication barriers. During technology transfer process, information that the transferor intends to send the transferee may be misinterpreted because of national and organizational cultural differences. Furthermore, some standardized operational procedures associated with the technology are rooted in the transferor's organizational structure and culture that may be difficult for the transferee to duplicate in a short period of time. The transfer technology may not fit well to the transferee's organization if the organizational gaps are significant. If there is a significant gap in the technological capability between the transferor and the transferee, the transferee might have difficulty in learning and understanding the essence of technology. [7]

D. Market BARRIERS:

There are consequently a variety of market barriers to effective technology transfer that prevent private companies from being easily incorporated into international policy and a host of informational, support, and capacity problems in supporting organizations when they do. Past experience in developing countries has indicated that market barriers may diminish international investment on technology transfer. Therefore, local knowledge of different markets, local knowledge of demands and marketing management of new technologies are necessary. These barriers can increase the transaction costs of investment and destruct available links between private sector and governmental organizations. Bellow (Fig. 1) represents most important technology transfer barriers that have been introduced in previous sections.

III. IRANIAN HEALTH SYSTEM

The present healthcare system in Iran has been started in 1979, with a major focus on easy access to services and prevention. The system is based on the 'health house', which is run by community health workers. The government of Islamic Republic of Iran integrated medical education into the MOH (Ministry Of Health) in 1986; hence, it is now called the Ministry of Health and Medical Education. The main purpose of the integration was to establish a more coordinated approach to health care provision and medical education. The proponents of the policy argue that integration has boosted the quality of health services around the country. They posit that using objective-based learning

lies at the heart of quality improvement. They contend that the political clout behind the care provision shifts resources away from the training of health professionals. Due to a lack of systematic studies to substantiate the arguments, the debate on integration remains unsettled. [8]

A. Principles of Iranian health system:

- Priority of preventive care as a long-term asset.
- Priority of rural and underprivileged areas, with special attention to high-risk groups.
- Priority of general practice over specialized medical care.
- Priority of outpatient over inpatient care.
- Maximum feasible integration of preventive and curative services.
- Decentralization, aimed at forming self-sufficient regional and local facilities [9]

B. Health system network in Iran

Health care and public health services are provided through a nation-wide network. This network consists of a referral system, starting at primary care centers in the periphery going through secondary-level hospitals in the provincial capital and tertiary hospitals in major cities. (Fig.2)

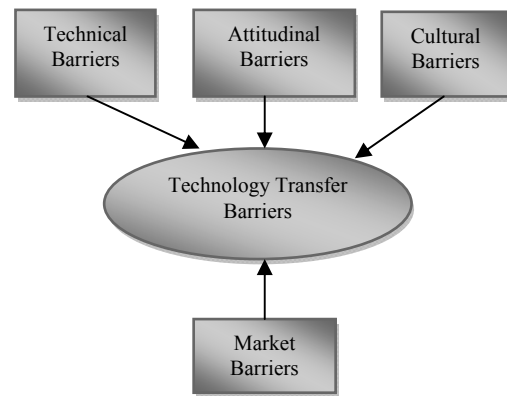


Fig. 1. Technology transfer barriers

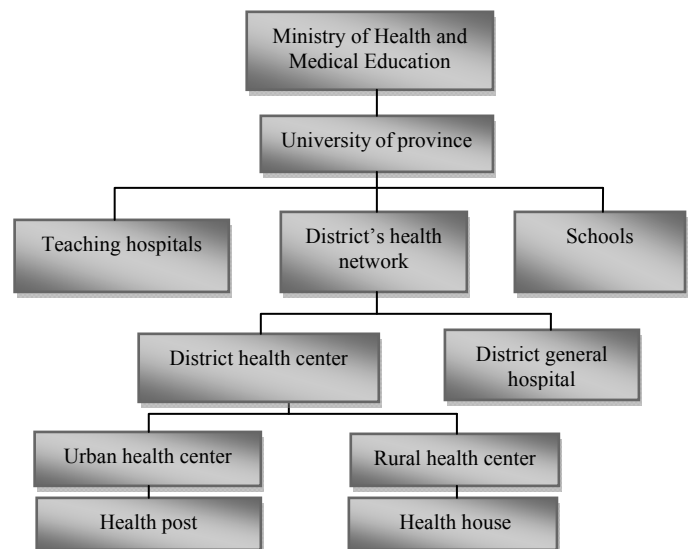


Fig. 2. Health system network in Iran [8]

The public sector provides primary, secondary, and tertiary health services. The emphasis of the government on primary health care over the last two decades has made the

public sector the main provider of primary health care services across the country. The public sector also provides a considerable part of secondary and tertiary health services in the province [8]. It is clear that private sector plays an important role in health care system in Iran and completely focuses on secondary and tertiary health care system in urban areas.

C. The strategic directions of WHO's work in Iran:

- Promoting health as central to sustainable human and economic development.
- Enhancing leadership capacities for reforming the health system.
- Applying risk management approaches to effectively deal with behavior related disorders and conditions.
- Addressing the unfinished agenda for communicable diseases.
- Promoting a culture of research and technological development.
- Strengthening institutional mechanism for effective emergency and humanitarian action for health.

WHO reports praise on the Iranian health system, saying: "Over the past 20 years, the Islamic Republic of Iran has made remarkable progress in the health sector with more improvements in various health indices." [10]. Some health indicators have improved, but there are some evidences show that Iranian health system is far from the Millennium Development Goals. The Third Five Year Social, Cultural and Economic Development Plan (2000-2004), sought promote the development of a knowledge society in Iran by strengthening the role of science and technology. This is further re-stated in the Fourth Five Year Plan. (Fig.3)

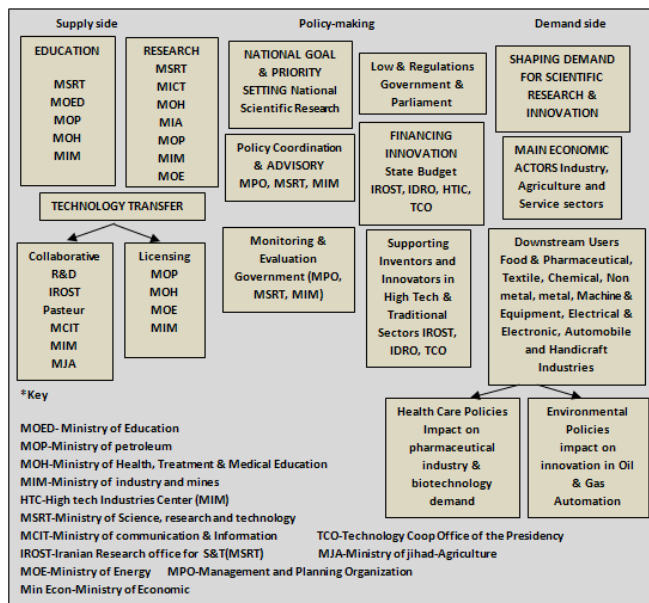


Fig. 3. Distribution of Functions in Iran's Policy Framework [10]

D. The Technology Cooperation Office (TCO) in Iranian health system:

The Technology Cooperation Office (TCO) traces its origins to the "Office of Scientific and Industrial Studies" founded in 1984 and given the task of providing Scientific and industrial advice to the President [10]. TCO developed its relation with international scientific researchers and

scientific institutions. In addition TCO plays an important role in promoting joint research projects between Iranian scientific institutions and international scientific research centers. Also TCO is divided into sector-specific, Research and Planning units and emphasizes on international cooperation in the field of advanced, appropriate, high and new technologies.

E. Lack of Technology Transfer Officer (TTO) in Iranian health system:

According our investigation there is no position for technology transfer officer in Iranian health system. On the other hand, some approves indicate that most medical devices and tools that use in Iranian health system don't produce in Iran. Thus, it is important for Iranian health managers to train technology transfer officers who monitor and control these tools during technology transfer process and after it. Most of these tools using high-tech approach. Thus it is obvious that this system needs people who have enough information and knowledge about them.

IV. COMMON BARRIERS OF TECHNOLOGY TRANSFER IN IRANIAN HEALTH SYSTEM

There are some common examples as technology transfer barriers which could be study in Iranian health system:

- Inadequate infrastructure to adopt technologies in health system
- Lack of awareness in the public and private sector in health system
- Lack of viewpoint and knowledge about the local requirements in health system
- Lack of trained human resources in health system
- Lack clear direction for engaging the private sector to promote cooperation and effective partnership development in national health system
- Lack of technical, financial and technology knowledge base for assessment
- Instability, inflation, poor macroeconomic conditions and disturbed
- Lack of incentives for private sector especially firms because of low technical capabilities and insufficiency investment in health system
- Lack of confidence to economical, commercial and technical issues
- Lack of purchaser's awareness of importing technologies and side – effects
- Lack of scientific, engineering and technical awareness of public health
- Lack of data, information, knowledge, awareness, executive sponsorship
- Lack of education and training infrastructure in health system
- High prices of the contracts
- Lack of exact research and development because of poor investments and financing mechanisms in health system
- Lack of public awareness, public acceptance and social issues
- Administrative bureaucracy and transparent decision-making process in health system

- Lack of time horizon for technology transfer
- Lack of accessibility, economically and availability of technology transfer
- Lack of Consideration of political issues in health system
- Lack of understanding on both sides, different languages spoken, issue of trust
- Lack of project management, difference of ideals
- Inadequacy of information and decision support tools represents a significant challenge
- Lack of cooperation amongst governments and public sector in health issues
- Lack of systems for collecting, synthesizing and feeding back information and knowledge
- Resistance to change at various levels of health system
- Intellectual property, License or patent issues, Low tolerance for risk in health sector
- Lack of clear requirements or performance measures
- Inadequate funding for technology transfer
- High transaction costs
- Trade barriers such as tariffs
- Insufficient human and institutional capabilities
- Poor understanding of local needs
- Lack of adequate codes and standards
- Absence of full-cost pricing
- Insufficient economic incentives / market penetration difficulties
- Lack of policy incentives
- Inadequate regulatory framework and technical constraints
- Poor institutional capacity
- Lack of trained human resources
- Information gaps regarding availability of technologies and potential to adopt them
- Lack of educational programs
- Lack of local capacity and training for personnel in health system
- Lack of research activities

V. THE PRESENTED NEW MODEL

This presented model is not a formalized operational type model, but it is an expanded conceptual framework of the Iranian health system. Also this conceptual model is drawn in Fig. 4, illustrating the main requirement of technology transfer. This requirement encompasses new technology, new demand, good information transfer, present technology, new information and using adequate resource. After defining type of barriers, these problems must be solved by new position (technology transfer officer). Now this position is responsible monitoring and controlling the process of technology transfer by means of research and receiving feedback during process. An assessment of a successful transfer without any barrier referring to whether or not the technology transferred actually achieved completely by users. Barriers, as already stated in the paper, must be trained to Iranian health staffs and resolved by them. The difficulties associated with overcoming barriers are referring to: new information, new demand, use of technology, the tacit knowledge embedded in the technological tools and

transmitter problems in knowledge transfer.

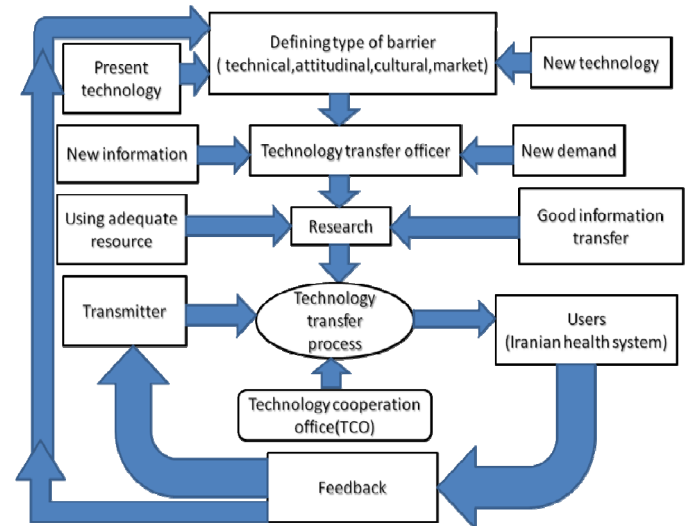


Fig. 4. New model for overcoming technology transfer barriers in Iranian health system

VI. RECOMMENDATIONS TO OVERCOMING BARRIERS IN IRANIAN HEALTH SYSTEM

Identification, analysis and priority of barriers are necessary. This part describes some suggestions to overcome different barriers given by some people who work in Iranian health system in the course of interviews. Most of them think that the government should provide the incentives in terms of facilitate the rules of import on the purchases in relation to health system instrument. Some of the Iranian health system staffs believed that the barriers related to negative impact on the communication, language barrier, concerns of different communicative norms and social structures could have been misunderstood among Iranian people. Hence, this kind of barrier could be overcome with the help of training programs by helping people to understand the actual benefits. Most of the staffs suggested that education, training modern technologies, technical revolution, using Information transfer in different levels, applying expert people, promote public awareness and technology promotional campaigns would act for overcoming most of the barriers since it would help people to be convinced with the probable benefits after the implementation of the technology transfer in Iranian health system. Some of these suggestions are:

- Developing communication infrastructure to support investments in health centers.
- Ensure assessment of local needs in health system.
- Creating awareness about technology transfer in Iranian health system.
- Expanding R&D program in health sector.
- Continuous improvement for the creation of an effective health system that is responsive to patients need.
- Designing a sustained partnership that is built on mutual trust and benefit in different parts of Iranian health system.
- Allocating more budgets for promoting technologies and substituting new technologies instead of old ones in Iranian health sectors.
- Supporting from international financial institutions and multilateral/bilateral sources.

VII. CONCLUSION

Technology transfer is not a formula but it is involving process. Therefore, in order to access a complete technology transfer, using of developed models and right implementation is necessary. The main aim of this paper was to make clear image on technology transfer and its barriers. Presented model illustrates the overall nature of technology transfer barriers in the Iranian health system. According to this model, overcoming technology transfer barrier is considerable strategic importance, but its implementation is often weakly understood. It is important to remember that this new model is one of a few models that have focused on technology transfer in health system. Therefore, it is recommended to Technology Managers and technology officers to apply it in a variety of same sectors in health system. This model also helps Iranian health staffs by capturing the main barriers and identifying how to overcome them. Our findings presented main strategic management problems that encountered Iranian health managers. Finally this paper determines some recommendations to overcoming these barriers and successfully implementation of technology transfer.

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