Iranian Journal of Medical Informatics (2016), Vol 5, Issue 1

Is that Possible Technology Transfer in the Field of Telemedicine?

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Abstract —*Technology can be the knowledge of techniques, processes, etc. or it can be embedded in machines, computers, devices and factories, which can be operated by individuals without detailed knowledge of the workings of such things. The purpose of technology transfer is Pre-defined set of activities in which necessary technology will be available for applicant. Telemedicine is the use of telecommunication and information technologies in order to provide clinical health care at a distance. The process of transfer of technology in the medical field not only of transport equipment but also in the field of telemedicine techniques will also be included.*[1]

Keywords — Telemedicine System, Technology Transfer

I. INTRODUCTION

Technology is the collection of techniques, skills, methods and processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation.

Technology can be the knowledge of techniques, processes, etc. or it can be embedded in machines, computers, devices and factories, which can be operated by individuals without detailed knowledge of the workings of such things (1).

Technology transfer is done in two ways:

Vertical technology transfer and horizontal technology transfer.

In vertical transmission or transfer of R & D, the technical information and results of applied research and engineering design is transferred to the development phase, and then Enters to production with the technology commercialization process.

At Horizontal technology transfer, technology transferred from one level of competence in a country to same level of competency in another place.

In this case, whatever technology receptor level is higher than other one, reduced cost of technology transfer and absorption is done more effectively(2).

The purpose of technology transfer is Pre-defined set of activities in which necessary technology will be available for applicant.

Technology transfer procedures in some cases, depending on technology receptor and provider conditions are so different and very varied.

Technology transfer can be performed in different forms like international technology transfer, regional technology transfer, industrial technology transfer, and technology transfer between or within companies(3).

I. METHODOLOGY

We based it on the search strategy, The Google scholar search engine was used to retrieve information from the internet, using the search string "+transfer + technology+ telemedicine" to find unpublished reports. We deemed 94 of 3040 titles identified in the searches potentially relevant. We excluded 64 of these after abstract review and another 16 after full-text review. The 16 articles selected for review.

II. FINDINGS

Technology transfer process is explained with six phases:

- Technology innovation
- Technology confirmation
- Targeting technology consumers
- Technology marketing
- Technology application
- Technology evaluation (4)

Phase One: Technology Innovation

In New Zealand research priorities are established by the combined wisdom of the Foundation of Research, Science and Technology, the Ministry of Research, Science and Technology, the Crown Research Institutes Board of Directors, and Committees on Science. The technology transfer process begins when a scientist starts communicating ideas of how science can be used to solve a problem or improve a situation in a research priority area. This technology innovation phase is represented by the exchange of information which takes place between the scientist, colleagues and administrators to advance ideas on the application of science.

New Zealand's most lucrative scientific assets are the ideas within scientists' minds. Therefore, any assistance which can be given to support other scientists in communicating their theories will facilitate the technology transfer process.

Such assistance can take the form of encouragement for scientists to communicate ideas with a diagram depicting how different factors (cell counts, hormone levels, chemicals, etc.) interact within a research project. A diagram is the first step toward communicating and refining ideas. The next step would be when the scientist starts discussing his or her theories with

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colleagues. This activity may aid the scientist in further refinement of the theories and gains suggestions for other possible commercial applications of the technology. In-house seminars and group discussions should be actively organized and supported by all scientists to encourage analysis and support or development of ideas.

After refining theories arising from the technology innovation, the scientist should submit research proposals communicating the concept to the appropriate funding agency. Such proposals should include plans as to how the research will in fact be applied. Scientists need to be proactive in suggesting end uses for the technology they have created (Risdon, 1992).

-Examples of Key Actions:

Idea of management practice or product innovation. Developing diagrams of technology innovation. Discussing theories with colleagues.

-Examples of Indicators of Transfer:

Display of technology diagrams.

Presentations communicating technology.

Research proposals advocating technology (5,6).

Phase Two: Technology Confirmation

The technology confirmation phase is represented by the scientist first conducting research which provides data in support of the underlying theory about technology and then communicating the results to colleagues, peers and administrators. Indicators documenting progress could be in-house "Eureka" reports which communicate research success to colleagues and administrators. For further information see, Bhattacharya, Glazer, and Sappington (1992) and Hughes (1992) who have developed mathematical models balancing the economic benefits versus the deficits of sharing research progress or results with colleagues and competitors. Trotter and Risdon (1990) address the issue of morale benefits which accrue from colleague interaction, establishing the close relationship between morale and productivity.

Indicators of transfer in this phase would be in-house reports, presentations and or publications substantiating research success, which aids science liaison within the science community.

-Examples of Key Actions:

Conducting research on technology innovation.

Discussing results with colleagues.

Reporting to science organizations.

-Examples of Indicators of Transfer:

Reports on research progress.

Communication of results to peers.

Documentation of results in science journals. (5)

Phase Three: Targeting Technology Consumers

During the third phase of the process decisions need to be made concerning who needs and can potentially benefit from the technology. The people involved in the targeting technology phase would be scientists and marketing personnel. These specialists need to be aware of factors such as cost, convenience, etc. which influence users' acceptance of new technology or factors which might serve to prevent the adoption of technology. A multitude of factors for socio-economic considerations for targeting technology change have been encompassed in models by Doherty (1990) and Knudson (1991). For further study, Swanson, Sands, and Peterson (1990) conducted an international study analyzing the influence different marketing systems had on technology acceptance by potential users.

Indicators of transfer for this phase would be the interactions of science, business, and marketing personnel to "brainstorm" technology acceptance considerations. Grundy and King (1992) advocate the use of a strategic planning process to steer the decision-making operation.

-Examples of Key Actions:

Deciding characteristics of potential consumers.

Targeting consumers with prescribed traits.

Estimating number of prospective users.

-Examples of Indicators of Transfer:

Reports of research results to key business leaders.

Communication with potential consumers.

Negotiation of potential acceptance barriers. (5,6)

Phase Four: Technology Marketing

The technology marketing phase of the process is concerned with disseminating the technology beyond the research centre. Key actions for science liaison involve the talents of scientists, business leaders and marketing specialists to educate potential consumers to the social, economic and environmental benefits of the new technology. Echeverria and Elliott (1990) suggest frequent interaction between research and marketing personnel; and the benefit of establishing a demographic profile of anticipated consumers before organizing communication channels. Knowing where the potential client usually gains knowledge of specialized products and or services will influence the selection of communication methods. Kaimowitz, Snyder, and Engel (1989) counsel using a variety of communication channels to stimulate public awareness and understanding of science or technology.

-Examples of Key Actions:

Analyzing demographic profile of anticipated consumers.

Preparing information-educational materials.

Transmitting information through mass media.

-Examples of Indicators of Transfer:

Organize and categories market constituency.

Production of educational materials.

Contacts with a variety of communication channels. (5,6)

Phase Five: Technology Application

The technology application phase concerns the understanding of users or consumers behavior and establishing predictable steps to monitor the commercial application of technology. The talents and skills of social and financial consultants, and marketing personnel are required to identify consumers' behavior and application patterns. Social, economic, and environmental factors which influence the rate of adoption of new technology are discussed in-depth by Arnon (1989). Chari and Hopenhayn (1991) have developed a mathematical model which weights social and economic factors and their influence

on the diffusion of technology innovations. The ratio of the number of consumers applying the technology to the number of potential consumers needs to be carefully monitored, to establish the market share reached.

-Examples of Key Actions:

Identifying consumers' behavior patterns.

Establishing application criteria.

Developing ways to monitor change and/or application.

-Examples of Indicators of Transfer:

Document steps leading to adoption.

Monitor percentage of consumers changing.

Document changes, adoptions or applications. (5,6)

Phase Six: Technology Evaluation

The sixth phase of the technology transfer process documents the success or lack of success of the technology to be adopted. Key actions for the technology evaluation phase are to establish assessment criteria for authenticating socio-economic and environmental benefits or harm. Guidelines for evaluating different types of technology innovations are proposed by Cummings (1990). Assessing technology transfer effectiveness generally requires specific criteria which can provide a basis for measuring the extent to which key actions have been attained. The method of defining specific criteria for indicators of transfer is essentially moving from broad to specific actions. The stronger the indicator of transfer, the more useful the indicator is for making decisions on present and future public good science funding. The technology transfer process ends when the scientists reports the evaluation findings back to the funding agency.

Technological level of developed countries and the Third World are tangible. To reduce this gap, technology transfer is an undeniable necessity.

The most important factors that determine a country's level of technology:

• literacy level of the people.

• The percentage of research funding to total GDP.

• The share of the total value of industrial added value of heavy industry.

• Higher education level or ratio of students to the total population.

• Scientific level or the number of researchers in the tens of thousands of the country's population.(5)

The Seven "C"s Model for the Transfer Successful Technologies:

Context

Technology transfer does not take place in a vacuum. The performance of a given technology is dependent on a wide angel of factors, making identification of an environmentally sound or otherwise appropriate technology somewhat problematic.

For example, a technology that is assessed to be environmentally sound in a given locale, culture, economic setting or stage in its life cycle may not be in another. Its performance may be influenced markedly by the availability of supporting infrastructure and by access to the expertise necessary for its management, maintenance and monitoring. Moreover, a technology that qualifies as being environmentally sound at one point of time, may not do so at another – the performance criteria against which it is assessed may change as a consequence of new information or changing values or attitudes; a Technical breakthrough may give rise to more desirable alternatives. It is therefore vital that recipients and users of a technology are able to choose an option that meets their specific needs and capacities, while also being environmentally sound in its operating locale and over its operational life cycle. It is, of course, highly desirable that the technology is also found to be economically viable and socially acceptable, and hence sustainable. (5,7-12)

Challenges

There are many barriers to successful technology transfer. All along the transfer path, from the supply side of technology transfer (the innovators and developers) to the demand side (the recipients and users), impediments occur at every nod end, due to restrictions on the movement of information and materials, for every linkage in the technology transfer chain. While some generalizations are possible, the specific nature and severity of the challenges depend on the prevailing circumstances, varying with the type of technology, its specific application and the characteristics of the technology providers and recipients. Examples of challenges include shortfalls in technology creation and innovation, under performance in technology sourcing, sub-optimal enabling environments, and insufficient and unverified information. Small and medium enterprises are disproportionately impacted by these challenges. (5,7-12)

Choice

A key aim of barrier removal, that is of facilitating technology transfer, is ensuring that technology recipients and users are able to make informed choices by being able to identify and procure the most appropriate (in environmental and preferably

Also in economic and social terms) technology for a given application in a given locale. Several requirements must be met,

Including:

•needs well defined, documented and understood; *f*

•several technology alternatives, all of which are well and reliably characterized in terms of environmental and economic performance and potential social impact; *f*

•rational and functional methods (decision support tools) that facilitate choice of an optimal technology; and

•capability to make the chosen technology fully operational, so that it fulfills its potential, and meets the identified needs, without detrimental side effects, including during decommissioning. (5,7-12)

Certainty

A lack of certainty, and the consequential high levels of risk, both real and perceived, are recognized as major impediments to the successful establishment and ongoing operation of functional markets for ESTs. The common perception that many ESTs are "emerging", and hence "unproven", means there is little confidence in their economic, commercial or technical viability. Removing barriers to technology transfer often translates into increased certainty, and

Decreased risks, for the key stakeholders such as the developers, suppliers, financiers, insurers, recipients and regulators. One example is ensuring access to sufficient, verified information. Risk assessment and management capabilities for financial institutions are also of special importance.

Policy instruments can also be used to enhance certainty, in two principal ways:

•through consistency in policy goals and measures over time , and with long lead periods for substantive changes in policy directions and the measure that implement them; and

•use of policy instruments to reduce regulatory, investment and other uncertainties in the market

Macroeconomic conditions that favour technology transfer include those which will deliver low inflation, stable and realistic exchange and interstates, pricing that reflects the true (marginal and fully internalized) costs of material, energy, labour and other inputs, deregulation, free movement of capital, operation of competitive markets, open trade policies and transparent foreign investment policies. (5,7-12)

Communication

The technology transfer chain is often long, in terms of both distance and time. Effective communication is thus another essential ingredient in the recipe for successful technology transfer. Efficient and effective two-way communication and cooperation between key stakeholders will do much to remove barriers. Information management systems, knowledge management tools and formal and informal networks, both centralized and dispersed, can all make important contributions. Technology transfer often involves a dissonant mix of informal actor (e.g. innovator) working in formal and highly regulated settings. Effective communication is a requisite to harmonizing the contributions to the processes of technology transfer being made by diverse players. (5,7-12)

Capacity

Enhancing the transfer of technologies that support sustainable development is largely about creating favorable circumstances for technology transfer – ensuring all stakeholders have the ability (potential and realized) to fulfill their roles and meet their responsibilities, expeditiously. Generally speaking, government is the principal player in creating an enabling environment for technology transfer, but financial and insurance institutions and international organizations can also be influential.

Circumstances which are supportive of technology transfer include:

Open and competitive market;

Comprehensive and credible specifications on the technology performance;

Financiers who are at least technology neutral;

The most cost competitive technology also has the most favorable environmental and social performance specifications; and policy risks are addressed.

All key players and stakeholders must have the necessary knowledge and skills to perform the roles and tasks expected of them.

High levels of awareness, motivation and empowerment within the public and private sectors and in civil society will help ensure that people, communities and wider societies are able to adapt continuously to new circumstances and challenges that drive and arise from technology transfer.

Effective and efficient national and regional systems of innovation, research and development should be in place, to facilitate such procedures as adaptation of traditional technologies for use in current settings.

The enabling environment also benefits from policy implementation that fosters an appropriate mix of government and private sector investment in ESTs and address such issues as lack of access to appropriate sources of capital, high or uncertain inflation or interest rates, subsidized average-cost (rather than marginal-cost) prices for material and

Energy inputs, high import duties, uncertain stability of tax and tariff policies; investment risk (real and perceived), loss of rights to intellectual property and to productive resources and risk of expropriation. (5,7-12)

Commitment

If there is to be an improvement on the last decade or so, where technology transfer failed to deliver the anticipated and much needed advances in development and sustainability, we must make a commitment to overcoming the challenges , providing technology users with the choice they deserve and desire, increase certainty, thereby reducing risks, enhancing communication between technology transfer stakeholders and building and strengthening the enabling environment and thus the capacity for technology transfer. (5,7-12)

Key actions that will foster technology transfer include:

Needs assessments, including identification of shortcomings in the enabling environment, with relevant organizations and agencies helping to address these; Evaluation and strengthening of policies that influence the enabling environment; Greater communication and interaction between key parts of government intra- and inter-governmental coordination, cooperation and assistance; Protection of intellectual property rights and legal contracts; Political support for programmers and institutions that foster technology transfer; Seed investment programmers to stimulate private sector investment; Capacity enhancement for major stakeholders; Delineation of the roles of the private and public sectors in both developed and developing countries;

Economic incentives targeting industries that have the potential to make critical and major contributions to technology transfer; and ensuring that technology transfer initiatives are compatible with national sustainable development agendas; Increase communication among technology transfer bodies across various multi-lateral environmental agreements (MEAs) with a view to leveraging limited financial and human resources on issues of common interest, integrating and strengthening regional and country level activities through information sharing and joint activities and providing a platform for multilateral approaches and consistency in technology transfer.

IV. DISCUSSION

The progresses in novel telecommunication technologies have created new chances to provide telemedical care and led to improvements in clinical outcomes in emergency medical care. Well structured outpatient care could reduce the need for hospital acceptation, comfort early intervention, prevent emergency management and avoid disease progression in these patients [14].

Transfer of technology in the medical field Health systems and health system as well as other areas in the face of new technologies have changed.

Therefore, a good understanding of the factors influencing the use of information technology in the health care system to develop strategies and programs for the effective use of this technology in the health system seem necessary.

The variable influencing telemedicine capabilities, as acculturation process, national policies, ICT, infrastructure, health, organizational readiness, national security policy and data protection, e-health national policies, effective implementation, IT infrastructure and a rational decision on the establishment of telemedicine in the country have a positive

impact variables power distance and uncertainty avoidance have significant impact(13,14).

Telemedicine is description of supporting medical services through the use of telecommunications. With telemedicine technology transfer will be an effective step in providing medical services. Like Virtual Autopsy (15) and Portable ECG Device for Diabetic Patients(16).These cases are shown The authors' experiences in the field of telemedicine technology transfer in phase one Technology innovation in university researches form.

ACKNOWLEDGMENT

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