

Original Article

Pages: 61-72

Government-Technology-University Model and Its Effect on Home Business

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Received: 2020/02/09 Revised: 2020/04/11 Accepted: 2020/06/15

ABSTRACT: Today, the systematic interaction between science, technology, and economic systems is clearly evident, and since development of scientific technology and investment in science is goal-, economy-, and technology-oriented, scientists do not consider specific borders between new technologies and sciences. Governments acknowledge the importance of higher education institutes as strategic actors in the scene of national and regional development, and thus they allocate special credits to specific outputs of scientific and technological collaborations. Hence, the government-university-technology relationship and its effect on entrepreneurship and creation of home businesses in Iran call for research and investigation. The research objective was to discover the effects three leverages, namely government, technology, and university, on each other and on creation and identification of entrepreneurship opportunities especially for home businesses. Research results suggest that these three axes lead to innovation, which results in entrepreneurship opportunities. The aforementioned opportunities may also lead to formation of home businesses (businesses operating from home). In this paper, the third mission of universities in addition to education and research, which is economic development, is discussed with regard to and home business and entrepreneurship as a means of adapting to Iran's national needs. The relationship between university and technology, which is targeted at business development, forms part of Iran's inclusive long-term scientific and technological policy. The present research was a desktop study, which was carried out using the field research method based on desktop investigations.

KEYWORDS: Triple Helix Model, University and Industry, Entrepreneurship, Home Business.

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1. INTRODUCTION

Half a century ago, the systematic interaction of science, technology, and economic systems had not been introduced in its today crystal clear form. At those times developments of science and technology were not interdependent and the effects of these two factors on economic mobility and flow of societies were unknown.

However, these three areas showed large degrees of interaction within half a century and thus scientists do not consider certain borders for new sciences and technologies. The reason is that development of technology has become highly science-oriented and investment in science depends on goals and economy- and technology-oriented objectives (Allen, G. C., 1981). In the early 1970s the concept for university-technology relationship was raised officially and this debate still goes on all over the globe (Bank, J. & B. Wilpert, 1983).

As two of the main components influencing harmonic sustainable development, university and technology can undermine the substantial pillars of society and national development if they can operate actively. Due to universality of knowledge, production of large volumes of information and continuous reproduction of scientific knowledge and technologies, universities will definitely play the main role in the resulting evolutions. Moreover, since continuous production of knowledge and scientific findings is based in universities, and since technology is considered the key executive basis of inventions and discoveries inspired by novel ideas of academics (Carayannis, Elias G, David F.J Campbell, 2010), these inventions and innovations lead to new entrepreneurship in Iran's economic system, which will eventually bring about national economic growth. Moreover, a country capable of forming and organizing the infrastructure and network of relationships between enterprises, universities and government will achieve scientific and technological advancements as well as competitive advantage through accelerated distribution of information, knowledge and products. In other words, efficiency of country's innovation systems depends increasingly on intensity and effectiveness of interactions between major sectors involved in production, dissemination, and utilization of knowledge. In this regard, the vital role of adaptive relations between university and technology and secondary factors influencing development of technologies and businesses, especially home businesses and innovations is stressed (Danilda & Torstensson, 2009).

Researchers have adopted different approaches to theorize the university-technology-government relationship system and analyse their interrelationships, and there are references in some papers to national innovation system and triple helix. Moreover, viewpoints resulted from these approaches to the university-technology-peripheral organizations (especially the government) are reported (Etzkowitz, H, 2008).

In this paper, by stressing objective relationships between three pillars, namely university, technology, and government, the characteristics of home business and the role of university and technology in development of entrepreneurship are discussed

2. LITERATURE REVIEW

In this thesis titled "clarification of effect of industry-university relationship development on entrepreneurship in Tehran", Gol Muhammadzadeh (2013) states that the relationship between industry and university can improve the trend of entrepreneurship in Iran by contributing to improvement of economic conditions and facilities of entrepreneurs, facilitating international laws and policies, enhancing social infrastructure, and affecting personal characteristics of entrepreneurs. Moreover, financial and cultural problems and social infrastructure, intermediary institutions (science and technology parks), government's role, environmental factors, international policies, and national research and education system are among the most important factors which a substantial role in the relationship between industry and university in Iran.

Morteza Hamrahi et al (2002). Carried out a study titled "suitable solutions for government-industry-university relationship" introduced collaboration between industry and university as a



irect path to transfer of technology. Industry owners and academic researchers demand this type of collaboration and welcome it. This bilateral collaboration between university and industry generally manifests through provision of training on shared experience with new knowledge and commerce. This transfer is bilateral, which means the professional knowledge of one party completes that of the other.

In a study titled “analysis of collaboration between industry, university, research institutions, and government in developing countries” it was stated that many developing countries are currently in the transition phase from the agricultural society to the industrial society or service-oriented society, while other countries are shifting from labour consuming activities to technology consuming activities. Many other companies are also shifting from traditional technology to more advanced technologies, and therefore degrees of change and success differ by country. Developing countries should consider future trends to be able to survive in the highly competitive society of tomorrow. These trends influence the economic and political status of these countries.

In a study titled “teaching entrepreneurship in university and its role in establishment and development of small- and middle-sized knowledge-based companies”, Kia Kajouri (David, 2012) introduced universities as the main custodians of education of expert human resources in society and stated that concern for university entrepreneurship contributes to improvement of education. In addition, entrepreneurs leading business achievements in society are capable of utilizing opportunities and are forerunners of creativity and innovation. Therefore, these entrepreneurs have a significant role in economic growth. Universities are also expected to pave the way for application and utilization of capabilities of university graduates and actualize continuous and comprehensive growth of university, industry, government and other sectors through establishment of knowledge-based SMEs by emphasizing their main mission, which is to educate and train. To this end, changes should be made in the type and method of teaching and the university-industry interaction.

3. THEORETICAL FRAMEWORKS

In the 1990s, innovation experts were trying to identify sophisticated mechanisms to transfer the university-produced knowledge to industrial enterprises and provide for their empowerment (e.g. Leydesroff, 1997; Ferneken, 1998). Hence, first the issue of industry-university relationship was raised and then macro innovation policies were formulated on the following three levels.

- Industry: Policies of this sector should facilitate and accelerate absorption and application of the existing knowledge.
- University: Policies of this sector should support and direct establish of strong links with the industrial society and commercialization of university research.
- Government: Application of empowering policies contributed to formation of a suitable interactive environment.

Hence, the triple helix model was introduced as an innovative model. This model, which advocates innovation and entrepreneurship at three major levels of interaction between university, government, and technology with emphasis on university, was proposed by Etzkowitz and Leydesroff (2008).

In view of related theories, the aforementioned model consists of the following four dimensions:

1. Changes and evolutions in each of the three helices



2. Pair-wise effects of helices
3. Establishment of new organizations, which expand the helix interaction scope
4. Recursive effects of institutions on one another and on the entire society, which lead to changes in the scopes and boundaries of each

Therefore, it could be stated that the aforementioned model pictures a dynamic evolving framework of different institutions with an evolutionary approach. This framework is capable of affecting other institutions with new inputs in each institution (due to mutual interactions) by redefining its functions and roles. As a result of these interactions, innovation improves and entrepreneurship emerges, and these two outcomes penetrate into other institutions and societies and allow for formation of new industrial, business, and commercial fields.

3.1. What Is Entrepreneurship?

“Kar Afarini” in Persian is an inaccurate translation of “entrepreneurship”. Several definitions of “entrepreneurship” have been provided in its literature. Entrepreneurship refers to innovation accompanied by rational risk and supply/organization of resources to discover and use opportunities for creating value, creating new business, developing existing businesses, solving problems of society, government and enterprises, and improving personal and family lives. There are different dimensions to business and entrepreneurship, yet home business is the only dimension discussed in this paper (Etzkowitz, H. and Loet, L., 2008).

3.2. Home Business

It includes that group of activities formed by one or several family members in a residential environment as a business that does not disturb or bother adjacent residential units and leads to provision of services or commodities distributable in the outside market (Etzkowitz, Henry et al., 2000). Home businesses are normally classified as very small-scale trades, and this term is generally used to refer to commercial activities which take place in a person’s home or residential place or which are home-based. In addition, most owners of home businesses reside in their business places (Etzkowitz, Henry, 2000).

4. RESEARCH METHOD

In this paper, mainly the desktop research method was used for investigations and field studies were used to analyse the university-industry relationship. In addition, regarding entrepreneurship process and university entrepreneurship as a means of adapting to Iran’s needs, the third mission of universities (i.e. economic development as well as education and research) was stressed and the entrepreneur university (as the source of knowledge-based enterprises) was introduced as the most important factor linking science to industry. Afterwards, the effect of home business on economic growth of societies and relationship of home business with technology, government, and universities were studied.

5. FINDINGS

Home business is highly important to economy. Although this type of business is often considered the hidden non-official part of economy, it plays a significant role in economic wealth and growth of a society and development of its social capital. For instance, some scholars believe that home business opportunities lead to self-employment which results in elimination of deficiencies and local needs of an economy and paves the way for sustainable economic development (Etzkowitz, Henry). Today, home businesses are considered the vital and necessary components of economic activities of developed countries. A home business brings about large diversity to the society and economy of a country by increasing employment and innovation in the supply of products or services. Furthermore, home businesses are suitable



starts for adolescents trying to kick off personal businesses, because they are easier to launch than other types of business. For instance, you can start an Internet business using a computer and a phone line to provide different services to people and earn money.

History of home business starts from working from home, which dates back to a long time ago. Perhaps it could be said that the notion of home business originated from emergence of sedentism and houses. A large portion of economic activities of pre-industrialist nations took place in their houses and residences, and fusion of the notions of home and business was not odd. Home business was more common in traditional and agricultural societies. However, following the industrial revolution its significance declined due to the border defined between workplace and home (Etzkowitz, 1996). With the industrial revolution and expansion of the factory system the border between home and workplace gained more definition and industrial and business centres turned into places for economic activities while houses became warm and peaceful places welcoming people tired of daily work in those centres. The economic shock caused by the OPEC energy crisis in 1973 drew attentions to the notion of home as workplace (Franklin, S.J. et al., 2001). Home businesses in Iran are very old. Many handicrafts of today used to be created by people in their houses and residences. In general, home business is not a new phenomenon, because it has drawn more attention due to changes and evolutions in today's economic-social activities and these businesses are expanding and growing day by day.

Importance of this type of business to improvement of life quality is so significant that most owners of home businesses believe that working at home enhances quality of their lives. By working from home more time is allocated to one's family and household and more attention is paid to other family affairs such as raising and educating children. In general, today living and working are more intermingled than ever.

5.1. Relationship of Government with Entrepreneurship and Establishment of Home Businesses

In this model, the government makes risky investments in production of knowledge, innovation, and production of commodities and services in addition to its traditional duties such as producing general commodities and setting policies. In the case of home businesses, the government can contribute to this type of entrepreneurship by passing acts to support such businesses and issuing permits for home businesses needed in society.

5.2. Relationship of University with Entrepreneurship and Establishment of Home Businesses

University plays a substantial role in development of entrepreneurship. In addition to its general role, which is to educate expert human forces and produce knowledge, university has special roles in this area.

The most important roles expected from universities in development of entrepreneurship include the following.

1. Creating an innovation movement in the country
2. Providing entrepreneurial graduates to society
3. Solving problems of society, government, and enterprises
4. Establishing a lifetime learning system to support entrepreneurial graduates
5. Educating expert forces for teaching, researching, consulting, and assessing entrepreneurial affairs
6. Providing scientific and expert support to economic-social reforms
7. Producing native entrepreneurship knowledge to meet national needs



8. Supporting formation and development of professional entrepreneurship networks
9. Founding companies based on high technology
10. Educating entrepreneurial graduates ready to launch new businesses (H.H. and Jaarillo J.C., 1990).

In addition to their previous activities and missions, universities practice entrepreneurship and innovative activities and contribute to development and establish of home businesses by educating expert work force.

5.3. Relationship of Technology with Entrepreneurship and Establishment of Home Businesses

The technology development system is a social, technical, and economic system, which is composed of input components, resources, processes, outputs, and feedback and control paths similar to any other system. This system has evolved over time in terms of structure and function. Structural evolution of this system can be analyzed from two aspects: evolution of constituting elements and evolution of the relationship between elements. The three important elements of this system include university, technology, and government, and the duties and missions of each of these three institutions have evolved over centuries similar to their relationships (Maital, S., 1984). Information technology includes empowerment mechanisms, which facilitate inter- and intra-organization information processing and flow. This technology contains the information created, used, and stored by a business and the technology utilized for physical processing in producing a special commodity or service. Information technology refers to the technological aspect of the information system and includes hardware, software, databases, networks, and other electronic equipment. Information technology (IT) has become a main and necessary partner, which increases the contact between consumers and suppliers on the global level. It is evident that information and communication are two important powers of today. These two powers are both valuable and create value. A person who is aware of different markets and price of products in such markets or a person who is aware of the past and future of markets is able to make better decisions to gain profit. In addition to its inherent value, information has another aspect which leads to knowledge and influences the decision-making mechanism and improves it. Similarly, information and communication are two major prerequisites of every entrepreneurial activity. Entrepreneurship is not possible in isolation and without the support of institutions, organization, and humans. In this discussion, the notion of information technology as a global entrepreneurship platform and entrepreneurs as the source of new opportunities for job seekers in the cyberspace are considered. These entrepreneurs form a wide range of Internet service and product providers as well as information technology (IT) experts and programmers. Hence, today's economy is based on innovation, creativity, and use of knowledge, especially the knowledge of Information and Communication (Etzkowitz, Henry, 1996). Information technology and especially the Internet have created a new environment where producers, suppliers, sellers, customers and almost all of the entities involved in an economic cycle are capable of communicating in a shared virtual space to exchange information, services, products, and money.

Due to the diverse applications of the Internet in the last decades this communication facility has actualized a hypothesis, which was previously introduced dubiously as the theory of "global village, for inhabitants of the earth. The unique features of the Internet have led to emergence of a new form of trade which is currently known as E-commerce (or E-business). Uninterrupted business interactions and ease of paying and receiving money have changed the shape and nature of business. In addition, due to the increasing influence of the Internet on different service areas, which is based on emergence of new needs, more people are attracted to the virtual labor market that take their chance on finding suitable professions. Institutions, organizations, and private and state firms of all countries are trying to introduce their products

and service on the Internet. Hence, the first need they are faced with is referring to people who own adequate knowledge and skills for such activities. Naturally, no institution is free of IT experts in today's world. The introduction of computers and related technologies to the labour and business market and the increasing utilization of Internet interactions have led to formation of a permanent labour market for IT experts. Therefore, information technology (as a phenomenon) has set the scene for entrepreneurship and creation of jobs in different fields (OECD, 2001).

With immense advancements in computer sciences and other communication tools, houses have become more suitable and effective for running businesses. In this regard, IT experts and professionals can benefit from opportunities created by companies to provide services and support customers remotely via the Internet and from their homes. Without the need for physical presence in a certain place, experts can handle supporting, planning, processing, designing, and development of software products and websites and even manage social networks from home.

5.4. Ideal Models of University, Industry, Entrepreneurship, and Home Business

The triple helix model adopts an evolutionary approach to depict a dynamic evolving framework of different institutions, and with formation of new institutions inside each institution (which is the result of mutual interaction) it can influence other institutions by refining its functions and roles. As a result of these interactions, innovations improves and penetrates into other institutions of the society, which subsequently provides for formation of new industrial, commercial, and business fields. Based on triple interactions between the government, technology, and university at least three forms of the triple helix model have been identified so far (Plonski A., 1996).

The first form (Fig. 1) includes the government, university, and technology and their interrelationships. An example of this form was dominant in former communist countries such as the Soviet Union. Today, this model can be observed in a less powerful form in some developing countries such as Latin America (Stanworth, J., 1989).

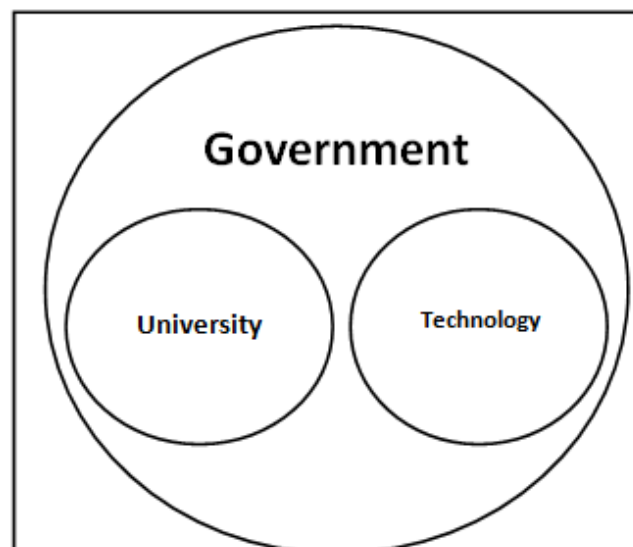


Figure (1): The first form of the triple helix model

In the second form (Fig. 2) borders separate government, university and technology functions from the powerful rationality, cultural, and technical borders. However, institutions mutually interact, and one of the main characteristics of this model is distribution of tasks between

universities, enterprises, and government. That is to say, the university is held responsible for teaching and research. Technologies or enterprises with technology turn research results into new services, while the government supports universities and enterprise with technology and provides the required infrastructure and circumstances (Wallace MJ, 1989).

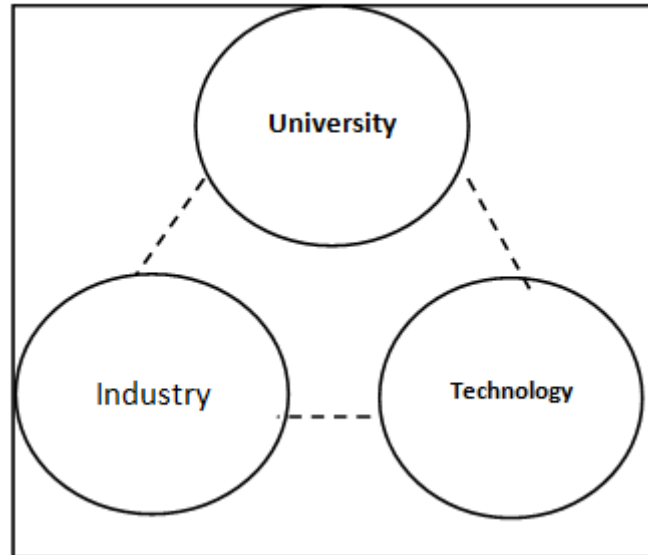


Figure (2): Second form of the triple helix model

In the third form of this model (Fig. 3), institutional territories of the university, technology and government overlap during innovation and their roles overlap in some areas. In this model, university takes entrepreneurial and innovative actions in addition to its previous activities and missions to create an entrepreneurial enterprise and commercialize ideas. On the other hand, technology also both conducts knowledge producing activities and absorbs the existing knowledge to increase production efficiency. Under this condition, the government makes risky investments in production of knowledge, innovation, and production of commodities and services besides its traditional duties including production of general commodities and setting policies (Warner M., 1996).

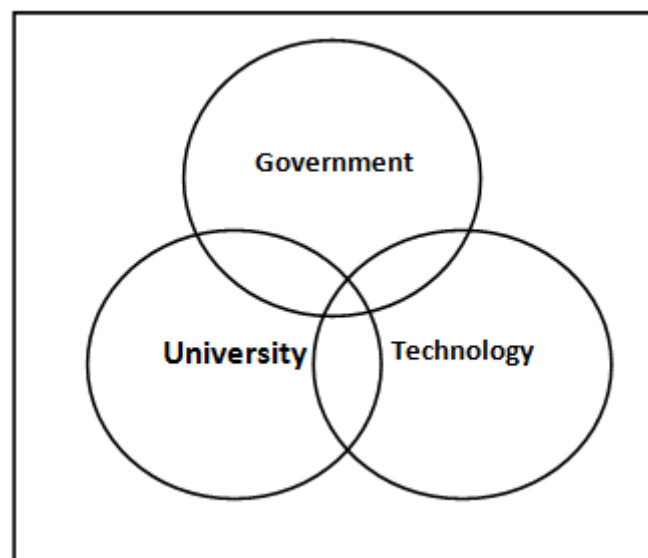


Figure (3): Third form of the triple helix model

In this dynamic model of innovation, the dynamic nature of which was pictured by Etzkowitz according to Figure (4), university sometimes acts as a knowledge-based enterprise which carries out knowledge-based entrepreneurial activities. Moreover, activities of the enterprise are also sometimes based on university, while university and technology create venture capital markets and human force and technology markets through their mutual interaction (Womack, James P., et al. 1990).

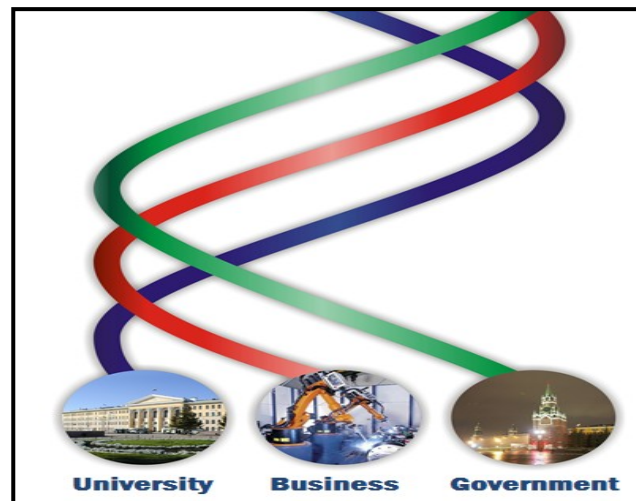


Figure (4): Fourth form of the triple helix model

6. DISCUSSION AND CONCLUSION

Our industries and universities have interacted in different ways so far. Training interns in industries, ordering research projects to professors to meet the needs of industries, consulting with academics and researchers, involving academics in different management sectors of industries, and using professors in Research & Development (R&D) units are examples of such interactions. Although this relationship has had positive consequences, the gap between the status quo and the ideal status indicates the necessity of further investigations. In recent years, a new mission has been assigned to universities in developed countries to establish an appropriate relationship between university and technology. The mission involves contribution of university to economic development through establishment derivative companies and development of knowledge-based technologies. Hence, the interrelationship between these three axes leads to innovation, which results in creation of entrepreneurship opportunities. These opportunities can lead to home businesses or businesses operating from home. The solution required for creation of this mechanism involves the new generation of universities known as entrepreneurial universities. An entrepreneurial university is a university which meets entrepreneurship characteristics. To attain scientific and technological goals in the long-term perspectives, which is pictured by the Supreme Leader, it is necessary to take necessary measures due to the intense competition and rapid economic evolution in today's world.

Some of the aforementioned factors can be solved and implemented through a coherent administrative process or organizations-administrative mechanisms.

- Lack of a common organization and coordinator: A coordinating organization can be designed to link the major actors of the university-industry relationship system.
- Lack of intermediary centers and common university-technology groups for attracting, developing, inventing, and disseminating technology: Numerous centers, intermediary



- units, and common organizations can be established to handle specific affairs in spite of having overlapping duties.
- Lack of elaboration on industrial problems in the form of research projects that can be conducted by universities: It can be achieved with a joint program launched by the Ministry of Industries and Mines and Ministry of Research and Technology.
 - Lack of close collaboration between industrialists and industrial experts in developing teaching and research programs for universities: It can be achieved by the Ministry of Science, Research, and Technology, Ministry of Industries and Mines, and national industrial associations.
 - Lack of a joint information system for the university and industry: With the infrastructure recently developed in Iran, this goal can be attained easily in the light of collaboration between Ministry of Science, Research and Technology, Ministry of Industries and Mines, and the Management and Planning Organization.
 - Effective participation of the banking and financial system in development of technology: It can be actualized through government projects and approval of policy makers.
 - Inability of universities to solve applied problems of industries: Universities do not believe this idea and argue that these potentials of universities can be utilized more than ever.

7. PRACTICAL SUGGESTIONS

Accordingly, to actualize innovation and entrepreneurship and establish constructive interaction between government, technology, and university inputs the following policies are recommended.

-The government should be transformed gradually from an actor and agent into an empowering agent and regulator to set the scene for encouraging home businesses.

-The role of university in triple interactions should be shifted from supplier of human forces to provider of research, technological, and industrial services. To this end, the structure of Iran's universities calls for a service-oriented architecture in addition to the traditional research and education structure. Therefore, in addition to planning on reducing dependence on state research budgets, universities should consider commercialization of research, technology marketing, and provision of infrastructure for home businesses and training of experts for managing businesses and identifying entrepreneurship opportunities.

ACKNOWLEDGMENTS

None.

ETHICAL CONSIDERATION

Authenticity of the texts, honesty and fidelity has been observed.

AUTHOR CONTRIBUTIONS

Planning and writing of the manuscript was done by the authors.

CONFLICT OF INTEREST

Author/s confirmed no conflict of interest.



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