Journal of Intellectual Property Rights
Vol 15, November 2010, pp 464-473

Promoting Nanotechnology Patenting: A New Experience in National Innovation System of Iran

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International circumstances, Iran's special context and its legal system have often been blamed for the relative lack of attention on the part of Iranian scientists towards Intellectual Property Rights (IPR). In spite of these odds, however, the Iran Nanotechnology Initiative Council (INIC) launched a programme to overcome existing shortcomings and encourage nanotechnology researchers to protect their inventions in the country and particularly, overseas. The efficiency and effectiveness of this programme are analysed in this paper. In a country without a national IP policy, successful implementation of this programme could pave the way for extending the same mechanism to other technological fields, although it is unlikely that the deficiencies of Iran's national innovation system could be completely resolved by such sectoral policies.

Keywords: Iran, patent, nanotechnology, national innovation system

Despite the fact that the first Iranian legislation on IPR dates back to 1920s, there is a clear lack of public awareness in Iran towards IPR, specifically, patents. In such a context, it is not surprising that patenting is not a popular option for most scientists and as a consequence, the number of patents registered is a rather small figure. Some reasons frequently indicated as the root cause of the lack of awareness are:

- In developing countries (specially oil-based economies like Iran), the number of innovations is principally very low and these countries have national learning systems (often inactive)[1] instead of national innovation systems. Hence, there is a lack of interest in registration of intellectual property.
- The US-imposed economic embargo has imposed limitations on Iran's international business relations in recent years. Given the fact that foreign companies are usually seen as the main users or beneficiaries of IP system in developing countries, their active technological presence in these countries is considered as a driving force in boosting the IP system of the host country. This has not been observed in Iran.
- Since the local industry prefers to fulfill its technology need through foreign expertise, the Iranian research community traditionally, does not expect a significant demand for its research outcomes. Iranian researchers hence, do not hesitate to publish their patentable findings in scientific journals, at least, to facilitate their academic betterment[2] and utilize benefits accruing from such publications.
- Several religious authorities have argued that IPR should not be considered as private property.[3] After the Islamic Revolution; Iran has witnessed many developments in the theories of religion-based jurisprudence, although, no consensus has been arrived at by religious authorities as to the legitimacy of granting proprietary rights to IP creators.
- The Iran patent system is a declaration-based one and, therefore, no substantial examination is carried out to determine the patentability of applications and claims therein. Hence, many patent certificates have been awarded in the past to non-patentable and sometimes well-known

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scientific subject matter. This has seriously undermined the credibility of the patent system.[4]
- The high costs associated with filing and prosecuting patents in foreign markets (e.g. the US, European countries or Japan), as compared to local patent costs acts as a major barrier too.
- The fact that very few professional patent attorneys are active in the country makes handling of foreign patent applications a rather complex issue for Iranian scientists.

The Iran Nanotechnology Initiative Council (INIC) established in 2003 launched a programme to encourage nanotechnology researchers to protect their inventions in the country as well as overseas. It was felt that in a country without a national IP policy, successful implementation of this programme, could pave the way for similar programmes in other technological fields, although it was implicit that the deficiencies of Iran's national innovation system could not be resolved by such sectoral policies.

Global Perspective of Nanotechnology Intellectual Property Rights

After emergence of information- and bio-technology, the development of nanotechnology is a new challenge for patenting regimes in all countries since the problems associated with patenting of nanotechnology are unique, it being a multidisciplinary science.[5] There are several reasons as to why nanotechnology requires special understanding and creates unique challenges to patent offices; some of these are:

Naturally Occurring Products[6]

Nanotechnology often draws from blueprints provided by nature, e.g. complex proteins represent naturally occurring nano-machines. This is similar to what was observed in gene technology which provided ways of using newly-discovered (but already existing) genes. As such, both fields of technology yield fundamental innovations that if patented, could monopolize naturally occurring systems and block further development.

Drawing on 'inventions' that already exist in nature, conflicts with several of the patentability requirements. First and foremost is the question whether such an innovation is an invention or a mere discovery? Secondly, the question of novelty arises. How can a substance that already exists in nature be novel? And finally, the question of whether such an invention satisfies the requirement of inventive step needs to be answered.

With nanotechnology, this problem becomes even more acute, since naturally occurring substances can be highly complex nano-machines at the same time. Patenting these substances would be like patenting pre-existing machines. Nevertheless, rejecting new effects since they lack inventiveness would be contrary to several patent practices.

Compound versus Apparatus Claims[6]

Patent laws distinguish between compound and apparatus claims. Nanotechnology blurs the line between these two. A compound is distinguished by having distinctive properties independent of its shape. Within this definition, shape is traditionally restricted to the supramolecular level. It does not, therefore, cover structures composed of single atoms. Chemical substances, of course, have a certain molecular structure, but they are substances nevertheless. Nano-machines, in contrast, can often be specified as complex molecular structures, but, at the same time function as very small machines.

Property and Trespass

According to individual ownership law, trespass or an entry into a house owned by another is a violation of privacy. Will a nano-device capable of passing through a wall and entering a house result in violation of privacy? The problem is that nano-devices can go undetected and are completely indistinguishable to an untrained eye. Moreover, should the entry and exit of a nano-device through the body of an individual, without any sign or injury, be considered as a violation of his or her rights?

Another important issue is the property rights of nano-device owners. If in a public place, a person inhales a nano-device and leaves the place with the nano-device in his person, is he a thief? Could the Government still be the executor of the laws, if the nano realm is considered as a personal asset? In this context, will the central government manage and control nano environment with the help of police? And if so, what equipments shall be needed to prove the violations? Although these are hypothetical questions, they reveal a lot about how nanotechnology is capable of seriously affecting not only intellectual property laws but also privacy laws.

Besides, nanotechnology can be used for surveillance which again may result in personal rights violations. It may be possible to enact laws and

regulations to protect peoples's privacy against violations using nano-devices but to what extent will execution of these regulations be possible, considering the plurality of nano-devices and the difficulty of distinguishing them?

Selection Inventions[6]

Nanostructures with new properties can come within the scope of protection of old patents describing macrostructures which do not have the effects that nanostructures have. This raises questions concerning the patentability of such nanostructures. Is the selection of a smaller size (nanoscale) within a range of perhaps ten thousand times larger novel? Is it inventive? Shall the old patent be limited in scope?

The Issue of Searching Prior Art[7]

Nanotechnology is an interdisciplinary field, and hence, the demands on the patent examiner's ability to interlink different knowledge fields continue to grow. An invention may comprise, simultaneously, for example, information on biology and semiconductors. The interdisciplinary nature of an invention presents problems not only to the application of patentability requirements, but also for the search in patent databases.

The Issue of Training Patent Examiners[7,8]

Considering that nanotechnology patents may need to be classified in several fields of the International Patent Classification or other local/regional classification systems, the evaluation of patent applications in nanotechnology demands appropriate selection of patent examiners and continuous training in order to build an analysis team that is able to follow the recent evolution in that knowledge field, to deal with interdisciplinarity and to avoid the granting of excessively broad patent claims.

Overly Broad Patents[8]

Another problem common to obtaining patents in an emerging technology like nanotechnology, is the risk that overly broad patents may be granted. Such patents could impede growth and innovation.

Considering above mentioned challenges, nanotechnology patenting has been paid much attention in global organizations like WTO[9], regional organizations like EPO[10], national organizations like USPTO and even some of the developing countries like Brazil.[9]

These challenges are also among those faced by legislators and patent offices in dealing with nanotechnology patents. Some of the international patent offices which have been dealing with these applications for some time, have already put in place, measures to deal better with nanotechnology applications, including:

- Creating a preliminary cross-reference classification for nanotechnology patents (designated as Class 977/Digest 1) by USPTO to facilitate prior search in the field.[11]
- Inviting nanotechnologists to educate examiners on the technology by USPTO.[8]
- Developing guidelines for examining nanotechnology patent applications.[8]
- Using a team approach during examination to account for the multidisciplinary nature of the field.[12]

Intellectual Property System of Iran

History

IP protection in Iran started with trademark protection in 1925. In 1930, a bilateral agreement between Iran and Germany granted equal treatment to subjects of each country with regard to various aspects of intellectual property despite the fact that at that time Iran had a legislation pertaining only to trademark protection. This bilateral agreement served as an impetus for the legislation that came up in 1931.

Trade name protection can be traced to the 1933 Trade Law, where a chapter containing seven articles was devoted to the issue.[13]

In 2004, the Protection of Geographical Indications Act was adopted and products with names of geographical areas which had characteristics and qualities of those areas could be protected. Finally, in 2007, the Law of Registration of Marks & Patents, 1931 was substituted by the Registration of Patents, Industrial Designs and Trademarks Law thus giving patents precedence.[14] (Tables 1-2)

Patenting Process in Iran

In 2008, the Patent, Industrial Designs, and Trademarks Registration Act came into force nearly 80 years after the first Iranian patent law. According to Article 13 of the Act, the Industrial Property Office (IPO) shall examine whether the application complies with the patentability requirements as articulated in Article 2 of the same Act and if the said conditions and requirements are duly fulfilled, it shall proceed to grant the patent and if not, the application is refused and the applicant notified of the decision.

Table 1 — Domestic IP legislations in Iran[13]

Legislation	Notable features
1925 Industrial and Trademark Act	Set in motion IP protection through trademark protection
1930 Parliamentary permission to exchange 'patents, industrial and trademark, trade names, industrial designs and industrial and literary rights protection agreement between Iran and Germany'	Bilateral agreement between Iran and Germany to ensure equality of treatment of their subjects in the mentioned areas, predates first national legislation regarding patents
1931 Patent and Trademark Registration Act	Replaced the 1925 Act and was the first legislation to grant patents for a period of 5, 10, 15, or 20 years according to applicant's preference (Article 33)
1933 Trade Law	Chapter 14 is devoted to trade name, however, bylaws required to establish the routines are yet to be prepared
1970 Act for the Protection of authors, composers and artists rights	According to Article 22, economic rights protected only if the piece is printed, distributed, published or performed for the first time in Iran, not abroad; economic rights protected until 30 years after the death of the creator (Article 12); produced-to-order, cinematic and transferred pieces are protected for maximum 30 years since their creation (Articles 13–16)
1973 Act for Translation and reproduction of books, periodicals and audio works	Amended the Article 22 loophole, requiring permission of copyright owner for reproduction in the same language and format (Articles 2 and 3)
2000 Protection of Computer Software Creators' Rights Act	Software can be patented if it conforms to 1931 Act's provisions for patentability (Article 2); economic rights protected for 30 years; rights will be protected if the software is produced and distributed for the first time in Iran (Article 16)
2003 Electronic Commerce Act	Article 62 requires that integrated circuits be protected under the 1931 Act; Articles 64 and 65 protect trade secrets in the realm of e-commerce; Article 66 protects trade names and domain names
2004 Ministry of Science, Research and Technology (MSRT), Establishment, Objectives and Functions Act	Article 2 of the Act delineating the missions of MSRT mentions 'the assessment and approval of inventions, discoveries and innovations to help in protection of IP and registration in the relevant authority', though, in practice, has not functioned as examination unit for granting patents
2005 Protection of Geographical Indications Act	Specifically drafted to protect geographical indications attesting to the origin of a product to a specific locality, provided the quality and characteristics of the product can be attributed to the locality indicated
2008 Patents, Industrial Designs, Trademarks and Trade Names Registration Act	Approved for a pilot 5-year period on 23 January 2008; replaced the 1931 Act and hailed as conforming to TRIPS and WIPO requirements; offers industrial design protection (chapter 2); protection up to 20 years for patents (Article 11); delineates compulsory licensing for the first time (Article 12)
	Added inventive step (or non-obviousness) requirement to novelty and utility requirements of the 1931 act, implicit differentiation between inventors and assignees

The above mentioned provision clearly shows that Iranian legislators were determined to change the former declaration-based patenting system into an examination-based one. In practice, however, lack of competence needed for examination on part of IPO has led to continuation of previous patenting procedures.

Also, the Iran's Patent, Industrial Designs, and Trademarks Registration Act of 2008, for the first time, introduced the concept of 'non-obviousnes' as a patentability requirement in Article 2. The Article 4 of the same Act indicated that prior art is everything disclosed to the public, anywhere in the world and, accordingly, clarifies that the 'absolute novelty' standard will be applied in Iran.[14] According to the same Article the following subject-matter is considered to be non-patentable:

- Discoveries, scientific theories, mathematical methods and works of art
- Schemes, rules or methods for doing business, performing mental or social acts
- Methods for treatment or diagnosis of human or animal diseases
- Genetic resources and genetic components comprising the same, as well as biological processes for the production of the same and
- Anything that has been already anticipated in industries and techniques.

IPR System versus Technology Policy

There was no significant relationship between the science and technology policy and IPR policy in Iran until recently. According to a research study[22] only Japan and the US have managed to achieve synergy

Table 2 — A comparative study of patent law in USA, Japan, and Iran

	US[15-18]	Japan[19-21]	Iran
The first patent law	1790, United States Patent Act	1885, Statute of Monopoly Patent	1931, Patent and Trademark Registration Act
Shift to 'First to file' rule	Not yet	1921	From the beginning
First attempt to clarify the invention requirements	1793	1960	2008, Patents, Industrial Designs, Trademarks and Trade Names Registration Act
Patentability of software	1972, Supreme Court ruling in *Gottschalk* v *Benson*	1993	2001, The Registration and Protection of Computer Software Act
Introduction of microbiology patents	1980, Supreme Court ruling in *Diamond* v *Chakrabarty*	1979	Not yet
Responsible for the Patent Office	Department of Commerce	Ministry of Economy, Trade and Industry	Judiciary
Grace period	1 year	6 months	6 months (since 2008)
Addition of 'non-obviousness' requirement	1850, Supreme Court ruling in *Hotchkiss* v *Greenwood*	1960	2008, Patents, Industrial Designs, Trademarks and Trade Names Registration Act
Adoption of the doctrine of equivalents	1853, *Winans* v *Denmead*	1998, Ball Spline case	Not yet
Term of protection	Up to 20 years from the earliest claimed filing date	Up to 20 years from the earliest claimed filing date	Up to 20 years from the earliest claimed filing date
Accession to the Paris Convention	30 May 1887	15 July 1899	16 December 1959
Accession to the Patent Cooperation Treaty (PCT)	24 January 1978	1 October 1978	Not yet

between their technology policy paradigms and the IP system, the former in a defensive mode and the latter in an offensive mode. The US industry is focused on the creation of new knowledge while most other countries seek the diffusion and utilization of technologies. The US believes IP protection is primarily for creation rather than diffusion and application of technology. As a result, internationally stringent IP regimes will be complementary to the mission-oriented policy of the US and the strong IP system will increase the economic value of the generated technology. The Japanese system is in favour of the industry rather than the patentee and favours the Japanese firm rather than the foreign inventor. The purpose of this system is to improve industrial development and to support the diffusion-oriented technology policy of Japan.

The modern IP system aims at encouraging inventions by international standards but has little relevance for industrialization and can even at times be disadvantageous for industrialization purposes. While weak IPR protection facilitates imitation of foreign technologies, stronger IPR encourage domestic innovative activities.

A key challenge facing the IPR system of Iran is the fact that the IP Office is under the supervision of judiciary. This has caused IP policy-makers to look at IP merely from a legal perspective. This is in total contrast with common practices around the world, wherein, IP systems are under the control of the government and directly influenced by economic and technological policies.

Nanotechnology in Iran

Nanotechnology is a fast emerging technology with multiple potential applications which is bound to affect various technological and social domains. Nanotechnology development will influence all social areas, including economics, hygiene, environment, law, and education.[23] Iranian policy-makers have placed special emphasis on rapidly developing technologies, particularly nanotechnology[24], in order to enhance scientific and technological development. The Government's attention to nanotechnology in Iran started in 2001 when Iranian President Mohammad Khatami established the Technology Cooperation Office (TCO) responsible for coordination of developmental activities for nanotechnology in the country. He was influenced by the biotechnology development in Cuba and was looking for some technology to be the cornerstone of scientific development in Iran. Nanotechnology was chosen due to: (i) its importance in the future of health, safety and industry in all nations, (ii) its huge market in the future, and (iii) to emphasize

that Iran is not far behind pioneer countries yet and can catch-up with them. In 2003, after extensive studies and analysis, the TCO recommended creation of a council and was given a task of defining the direction for nanotechnology development in Iran. The TCO also concluded that nanotechnology development in Iran required national initiative and the National Iranian Nanotechnology Initiative (NINI) was subsequently approved by Iranian cabinet in July 2005 (ref. 25).

As a result of the NINI's initiatives, many Iranian universities and institutions focused on different courses related to nanotechnology. Several institutions and laboratories established infrastructure for nanotechnology research. As a result, in 2008, Iran stood 25th in the worldwide ranking relating to nanotechnology articles.[26]

The Iranian Nanotechnology Business Network (INBN) was later established in 2008. This network is composed of a group of business advisors and investors to help and promote Iranian companies/enterprises active or at least interested in carrying out businesses in the field of nanotechnology. The network also facilitates international cooperation and marketing. Now, Iran has more than fifty startup companies and another 15 companies active in production of nanotechnology related materials or products, among which, some have even been successful in exporting their products.

Since the issue of standard is very crucial for the development of any product including nanotech products and Iran is an active member of the international nanotechnology standardization committee of ISO (ISO/TC229 committee), INIC organized close collaboration with the Institute of Standard and Industrial Research of Iran (ISIRI).[27]

Nanotechnology is thus, a successful case of the country's planned entry into development area of technology. In other words, for the first time, before facing the wave of imports of technology products, Iran worked out a planned entry which could act as guiding pattern for other emerging technologies.

Iran's Policies for Support of Nanotechnology Patents

As the managers in NINI were aware of the limitations of the Iranian IPR system and its negative impact on development of technology as had been seen earlier in the case of software technology, they were attentive to intellectual property in the area of nanotechnology since the beginning. Accordingly, one of the NINI's 12 strategic points is: 'establishing a framework and needed network for safeguarding intellectual property rights, legitimate diffusion and exchange of research findings and know how and …'

Also, at least, 4 out of 53 programmes in NINI are related to IPR, including:

Setting and approving regulations and establishing necessary judicial infrastructure for issuing judgments about crimes and possible violations regarding research cooperation, production, commercial and other fields of nanotechnology

- Training individuals with managerial, business and legal skills in nanotechnology field
- Setting special standards about the methods of taking advantage of information and support of copyright
- Awarding promotional prizes to scientific, technology and industrial achievements of individuals and institutions based on evaluations

From abovementioned programmes, the only cases that have achieved significant results, were international partnerships in standardization, and support to patenting which is the main highlight of this article.

Supporting Nanotechnology Patenting

Financial Support

There are financial supports available to the following:

(i) Patenting costs up to 80 per cent are provided for patent applications in countries with examination-based patent system. The mode of payment is step by step with approval of the company which provides intellectual property services. Funding of up to an amount of US$ 6000 is provided to inventors too to encourage them. Of this, 50 per cent of is paid after the invention is filed and the remaining 50 per cent is paid after grant.

(ii) A special bonus is paid by INIC to any institution or company that manages to license its patent to foreign companies. The bonus amount is up to US$ 30,000 depending on the conditions of the licence agreement.

Training Support

To alleviate the poor IP awareness among Iranian companies and scientists, INIC supports Iranian and foreign experts to hold workshops on IPR, patenting, licensing, etc. This has already proved to be effective in training persons with minimum capabilities to search and analyse patent information.

Institutional Support

INIC supports two types of institutions by according subsidies and research grant. They are:

1 Private companies providing specialized IP services (four such small companies so far) offering the following services:

- Investigation of potential of registration and protection of trademarks
- Prosecution of patent, trademark and industrial design registration in Iran and other countries
- Consultation services in all areas of intellectual property, including advice on most appropriate methods to protect intellectual assets
- Monitoring violations of trademarks registered in Iran and other countries and litigation services
- Freedom to Operate (FTO) services
- Professional patent search and analysis services.

2 Academic IP institutions (nine institutes so far) that offer the following services:

- IP awareness building through seminars and educational workshops
- Formulation and implementation of intellectual property policies
- Assistance to researchers in use of patent information to improve the quality of research and prevent research in already patented areas
- Prior art search and preparation of patent application
- Consultation on IP commercialization
- Facilitation of selection and registration of protection-worthy trademarks
- Drafting non-disclosure or secrecy agreements
- Patent search and analysis services

It should be noted that (i) many of these institutions and companies are still in the learning stage and not yet completely capable of providing the above-mentioned services and (ii) their services are not exclusively for nanotechnology.

Achievements

The support from the INIC has yielded some good results so far. At the end of 2009, more than 60 invention reports were received by INIC intellectual property division, out of which 17 were entrusted to patent attorneys, 11 were filed in USPTO and the rest in EPO/WIPO.[28]

In 2007, Iran was ranked 22nd in terms of number of nanotechnology patent applications in European Patent Office and 42nd in the world.[29]

It is notable that based on USPTO statistics[30], the number of patents from Iran between 2004 (the year INIC was formed) and 2008 were just eight and it seems that Iran does not have considerable non-nanotechnology patents in USA (and maybe other countries).

In Iran, over 50 universities are active in nanotechnology research. The number of researchers in nanotechnology or those who have graduated in nanotechnology are more than 2,000. Moreover, 40 laboratories are involved in nanotechnology research, 10 divisions facilitate patent protection and commercialization, 70 industrial companies and 20 companies with nanotechnology products are active in this field. There is no doubt that the number of nanotechnology patents in Iran is not proportionate to the research investments in the same area. However, the increase in the number of international scientific papers published in nanotechnology from Iran has been very significant Fig. 1.

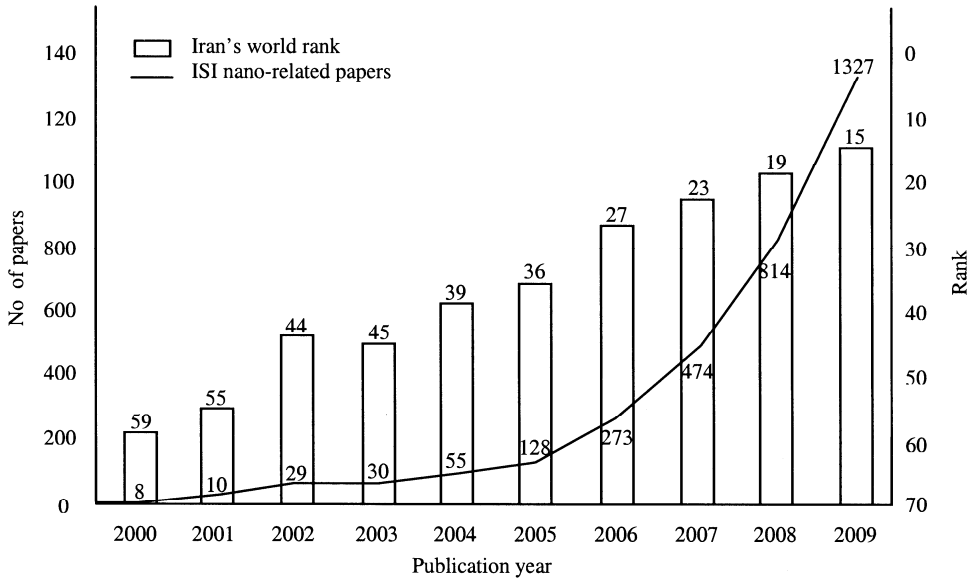

Fig. 1— Number of ISI nano-related papers by Iranian authors and world ranking of Iran (Source: http://en.nano.ir/index.php/main/page/17)

Limitations of the Initiative

It is clear that the INIC support has led to increased number of nanotechnology patenting by Iranian scholars and in this aspect such support should be considered successful. Effectiveness of the measures, however, needs to be judged taking into account the original objectives.

One of the major policy concerns since the establishment of NINI has been the possibility that a majority of nanotechnology research outcomes would be disclosed in scientific papers instead of leading to new and improved technology-based products and wealth creation. Therefore, the policy makers considered patenting abroad as a tool in overcoming this problem. This policy, however, has its own pitfalls.

The incentives given to nanotechnology research have resulted in a situation wherein patent registration is considered as the ultimate goal not as a tool. Iranian researchers apply for nanotechnology patents often to receive benefits in terms of patent costs and personal betterment without being concerned about commercialization.

In other words, companies, universities and individuals who register patents generally lack a commercialization strategy and often have no idea whatsoever on how to introduce their products into the market. They cannot manufacture a product from the invented technology and even if they have the ability, they cannot market the product because of scarcity of industries relating to certain nanotechnology areas like nanotubes. Very few have the ability to sell patents or even establish partnerships with foreign companies and even if they possess the ability, international sanctions against Iran do not allow them.

In other words, on one hand, NINI's action cycle is deficient and needs revision[24] and on the other hand, the transformation cycle of science and technology to innovation and wealth (or national innovation system) has numerous weaknesses and missing links.[31] In such a scenario, INIC's financial incentives for nanotechnology patents registration are good but not enough.

Of course, in case of selling the patent to a foreign party, INIC grants an incentive up to US$ 30,000 but no examples exist and even if such a contract were made, it would meet with a lot of suspicion.[32] In existing conditions where political, legal, economic and systematic infrastructure for innovation development are not appropriate in Iran, INIC's attempts for development of Iran IPR system in nanotechnology is an example of the Iranian proverb 'clapping with one hand does not produce any noise'.

Conclusion

In spite of all the inadequacies mentioned above, support in the form of incentives for nanotechnology patent registration has significant impact in certain areas and performed important functions.

- Modelling: The successful experience of INIC in nanotechnology, led to similar councils for development of other technologies headed by deputy president for S&T, supporting registration of patents. This has resulted in an increase in patenting abroad with the government continuing to support registration of patents in various fields.
- Recognition of weaknesses: The nanotechnology experience has shown that patent registration is not the ultimate step and Iran must try to establish an inclusive national system of innovation. This shall be a step forward compared to the previous mind set in which research only led to publishing articles.
- Creating awareness: In the past few years, experience gained from registering nanotechnology has facilitated familiarization with foreign patent laws and procedure. Iranian lawyers have been able to find the way through the complex patent registration processes in the US, Europe and Japan and also identify key individuals and institutions in this field. However, the area in which expertise is lacking is litigation in foreign courts.

Thus, it must be said that although, money spent on encouraging nanotechnology patents registration has not been much, the achievements are significant. Nevertheless, following areas need more attention:

- Filing for patents in international centres may be important, but for a country with one of the most closed economies in the world, an effective national system of patents registration within the country is more important. Although, some steps were taken to revise the Iranian IPR system[14], policy makers still view IPR as a strictly legal or technological issue than a commercial one. This approach needs reform, since it is unlikely to create the requisite synergy between Iran's technology development systems and IPR as has been the case in other countries.[22]

- Nanotechnology patents have unique characteristics which envisage restructuring in the national system of patenting. Since modifications in the patenting system were last made in consonance with entry of information and software technology; nanotechnology patenting will be affected in case corresponding reforms are not carried out for this area.
- Although replicating the policies of nanotechnology patenting support for other technologies is growing, policy-makers must take into consideration specific characteristics of each technology in IPR context instead of simply emulating INIC experiences.
- All indicators point to continuous growth in technical potential for development of technology in Iran, although what prevents the effectiveness of these capabilities resulting in innovation and wealth is inadequacies in areas such as policy making, law, commercialization and other soft issues. Perhaps the most important cause of this backwardness, in addition to neglect on the part of policy-makers, is lack of effective international communication, lack of participation of international companies and foreign direct investment (FDI) in Iran. Policy-makers of the national innovation system should realize that development of innovation in the current scenario requires extensive interaction with international markets and familiarity with its rules such as TRIPS.

Finally, it needs to be understood that government incumbency plays a very important role in a country like Iran and anything that directs the interests of researchers, universities, industries and the government in inconsistent directions annihilates technology development policies. In due course, support to patents registration may suffer the same fate.

The issues discussed are novel to Iran and what has been resolved in other technological areas or other country jurisdictions still need a lot of consideration and working. However, since INIC is now the pioneer for technology policy-making in Iran, there is hope that discussions would resolve these issues gradually causing common issues in other technological jurisdictions also to be resolved.

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