REGIONAL INNOVATION SYSTEM ANALYSIS MODEL: THE CASE OF IRAN

Seyed Abbas Mousavi Tatfi
Rahedanesh Institute of Higher Education, Iran
sa.mousavi78@yahoo.com

ABSTRACT

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This article aims at analysing and assessing the innovation system in Iran within a regional context. The World Bank Institute Knowledge Assessment Methodology (KAM) variables were adopted to create the regional innovation system analysis model for this study. The research analyses was based on cross-country comparison. The findings showed that, though science and technology growth in Iran was fast, the dominance of the government sector in R&D lags Iran far behind the innovative countries. Finally, the article provided policy implications and suggestions based on the findings of this study.

Keywords: innovation, economic, development, government, regional.

JEL Classification Numbers: O1, O2, O3, O5

INTRODUCTION

Iran possesses a comparatively steady macroeconomic environment with a low public debt and high rate of national savings. Likewise, it benefits from its large market size that enables local businesses to obtain economies of scale in the domestic market. Along with rather strong macroeconomic environment, Iran has boosted innovation. It has been ranked 66th innovative country among 139 countries worldwide (Schwab, 2010-2011). It is one of the fastest growing countries in the fields of science and technology. Science-Metrix (2010) has placed Iran in the high rank globally in terms of scientific development with a growth index of 14.4 after South Korea that enjoys a growth index of 9.8. The average growth rate of Iran in the fields of science and technology was eleven times more than that of the world in 2009. Its output increased to roughly 1% of the world's total output in 2009, from 0.13% in 1999. Iran has also exceeded the total annual output of such countries as Switzerland, Sweden, Israel, Denmark, Belgium, Finland, Norway and Austria. With annual 25% growth rate in the fields of science and technology it will achieve the level of the annual output of Canada by the end of 2017 (Science-Metrix, 2005).

It is usually agreed that innovation is the key driver of economic performance. The more innovative is the country, the higher is its gross domestic product per person. Competitive changes and innovation in advanced countries are described as the challenges of creating and commercializing new products and processes, shifting the technological innovations so fast, to the extent that their rivals fail to catch up. In addition, statistical comparisons of economic performance among countries showed that the intensity of national innovative activity is correlated with higher rates of standards of living and productivity growth (Tyng-Ruu Lin *et al*., 2010). Policy-makers and analysts have come to the consensus that the strength of the countries depends increasingly on a knowledge-based economy (Uhlaner *et al*., 2007). If technological progress can boost overall improvements in living standards, many countries lack high living standards because of the lack of technological innovation (Conceicaoa et al., 2003). Understanding this fact, this paper is trying to provide the information, which could help such countries to develop strategies for benefitting science and technology innovation. The research effort is devoted to the task of analysing and assessing the innovation system of Iran highlighting its strengths, weakness and opportunities.

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This paper applies qualitative and quantitative data to demonstrate the current state of the innovation system in Iran and to provide implications for the possible policy changes in the future.

Recent Economic Achievements in Iran

Economic Overview

As it can be seen in Figures 1 and 2, Iran enjoys the third largest reserves of petroleum in the world after Saudi Arabia and Venezuela, the second largest economy in terms of gas reserves following Russia, and it is the second largest economy in Middle East and North Africa.

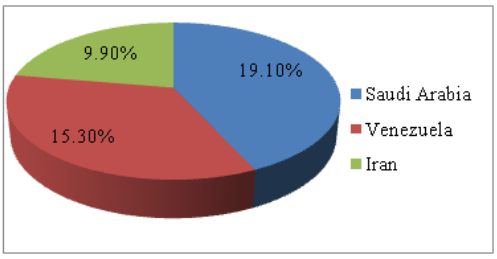

Figure 1. The World's Largest Petroleum Reserves.

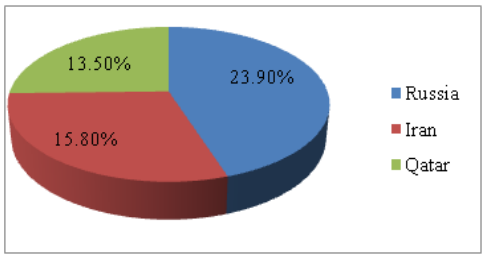

Figure 2. The World's Largest Gas Reserves.

The economic growth of the country slowed down in 2009, as presented in the Figure 3. The underlying causes include decrease in international oil prices, restricted oil revenue savings and inadequate management of domestic economy. It picked up modestly in 2010. At the beginning of 2000s, the economy of Iran experienced high growth with the annual change in real GDP reaching 9.12% in 2007. The economic growth during this period was due to increased government expenditure on main economic sectors, growth in private and credit consumption, and expansionary policies in monetary and fiscal economies.

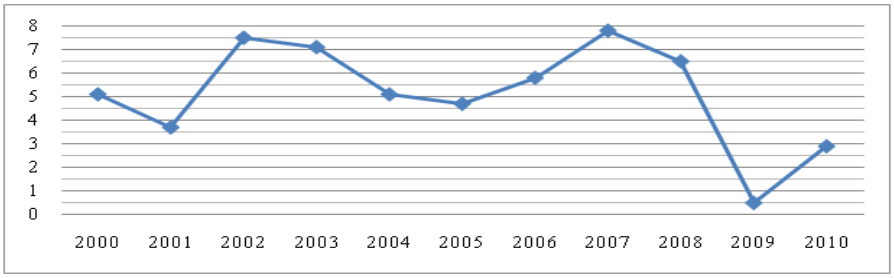

Figure 3. Iran's Average Annual Real GDP Growth %: 2000-2010.

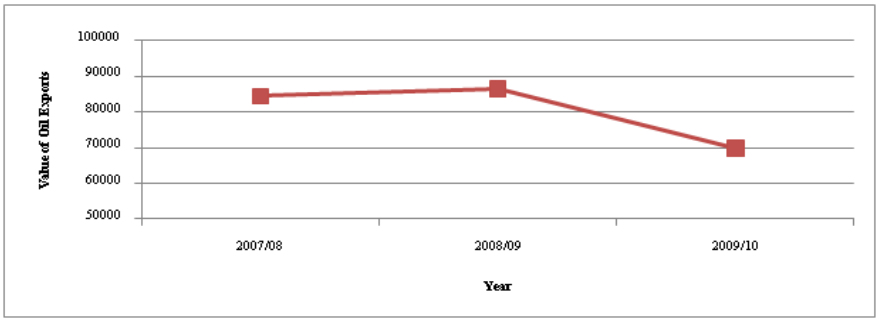

Figure 4. Value of Oil Exports (billion dollars).

However, in recent years the imposed sanctions restricted oil and gas exports in Iran. As a result, despite high international oil prices, the oil and gas sector has not contributed much to the economic growth (Figure 4). The economy of Iran has also suffered by low levels of foreign investment and production in oil and gas sector because of the U.S. and U.N. sanctions. However, the low investment rates are not the only economic obstacle created by the sanctions. The high foreign currency rates and the lack of exports and imports have resulted in other major problems such as double-digit rates of inflation constantly hampering Iran's economic growth. Although high inflation is common among the oil-exporting countries, Iran has one of the highest levels of inflation with Consumer Price Index inflation level going beyond 25% at the end of 2008 (IMF, 2010). Two of the domestic factors underlying high inflation include increasing consumption demands and expansionary economic policies.

Furthermore, the unemployment rate, reached 13.5% in 2010, is considered high. Some observers argue that the unemployment rate in Iran is in fact even higher than that reported by the government. High unemployment rate in its turn results in poor population. In 2007, population below poverty line reached 18% (CIA, 2011). Every year around 750,000 citizens enter the labour market imposing responsibility on the government to create new jobs. Because of the lack of new jobs, emigration rates increase. Young educated and skilled professionals continue leaving the country posing a serious problem. According to the report of the World Economic Forum, Iran has the world's highest rate of "brain drain".

Manufacturing Sector

Due to the global recession and its impact on the economy of Iran, and in addition to some other negative internal and external factors, the manufacturing sector, experienced a slow growth in 2009/10. However, initial estimates indicated that manufacturing sector had a growth in 2009/10, but the achieved growth was well below the annual growth target set in the 4th Plan for the year under review (12.4 %). The economic and financial performance of the top 22 manufacturing companies in Tehran Stock Exchange (TSE), which comprise almost 25 % of total output of large manufacturing establishments, suggests that sales value and the accumulated profit of these companies had 10.3 and 1.3% growth, respectively, on nominal basis in 2009/10 compared with the previous year. These growth rates, in real terms, showed 7.1% increase and 1.6 % decrease, respectively. The 'profit to sale' ratio of these establishments declined in 2009/10 to 14.9 % from 16.2 % in 2008/09, indicating a decline of 1.3%. The limited growth of manufacturing sales and decline of profit to sale ratio were because of difficult competitive environment for local producers and increase in production costs of establishments, including rise in wages and salaries.

Iran boasts the second largest manufacturing of petrochemicals in the Middle East. The National Petrochemical Company reported that petrochemical products amounted to 34.4 million tons in 2009/10 (including the performance of privatized companies), indicating 14.6 % increase. The corresponding growth figure of the previous year was 25.9 %. The value of petrochemical exports amounted to USD 9.1 billion in the fiscal year 2009-2010, which is an increase of 16.6 % from the previous year (CBI, Annual Review 2009/10).

In 2010, Iran was ranked the world's 16th motor vehicle producer, with its production increasing by 14.7% from the previous year (OICA, 2010). It entered into joint ventures with such foreign auto producers as Peugeot and Citroen, Volkswagen, Nissan and Toyota, Kia Motors, Proton, and Chery. According to the Supplying Automotive Parts Company (SAPCO), 1.42 million light and heavy vehicles were manufactured in 2009/2010, showing 9.3% growth from the previous year.

Iran is also the biggest producer of steel in the Middle East region and a major global steel producer. It is among the world's top 15 steel producers and 10 top steel importers in the world (ISSB, 2011). According to the periodic reports released by Iran Mercantile Exchange, the volume of crude steel production (by public sector) was 10.665 thousand tons, copper (cathode) 210.3 thousand tons, and aluminium bar 278 thousand tons, indicating 1.7, 2.1 and 12.1% growth, respectively.

Foreign Direct Investment (FDI)

Strong FDI increases innovation as 'inward FDI is an important channel for knowledge diffusion, while outward FDI is a means of sourcing technologies and knowledge from elsewhere' (Tyng-Ruu Lin et al., 2010).

Being the most populous country in the Middle East and with enormous natural resources, Iran actually is a very attractive market for foreign investment. However, foreign direct investment historically has been low in Iran as compared to other countries in the region (Table 1). On the one hand, strict domestic regulations and government reluctance to accept foreign investment have resulted in low levels of FDI, such as buyback system that restricts the foreign investment in the energy sector. On the other hand, international sanctions and political instability have constantly hampered Iran's economy in recent years. The United States' Treasury Department places pressure on international banks not to have any relationship with Iran. Thus, foreign companies face huge difficulties in making financial transactions or obtain financing to do business in or with Iran. Moreover, they avoid investment in Iran to preserve good relationships with the U.S.

Table 1. Foreign direct investment flows, 2007-2010 (in millions of US dollars).

Country	2007		2008		2009		2010	
	Inward	Outward	Inward	Outward	Inward	Outward	Inward	Outward
Iran	1,670	302	1,615	380	3,016	356	3,617	346
Egypt	11,578	665	9,495	1,920	6,712	571	6,386	1,176
Turkey	22,047	2,106	19,504	2,549	8,411	1,553	9,071	1,780
Saudi Arabia	22,821	-135	38,151	3,498	32,100	2,177	28,105	3,907

Regional Innovation System (RIS) Analysis Model

RIS is often defined as a set of private and public interests, institutions and organizations that interact with each other with the goal to generate, use and share knowledge (Doloreux, 2003). RIS constitutes a set of public and private institutions that function to encourage firms in a given region to implement such practices, values, norms, attitudes and culture that will enhance innovation and knowledge transfer processes. Innovation policies are best managed at the regional level because: first, specific factors such as industrial and institutional structure, labour force, R&D efforts and the way they interact influence the way innovation occurs in different regions; second, geographical distance is important for knowledge transfer. Despite the rapid advances in telecommunications, face-to-face communication is still the best way to stimulate frequent and substantive knowledge transfer.

In 2008, the World Bank Institute created the Knowledge Assessment Methodology (KAM) for the countries to identify opportunities and challenges they face in transitioning to the knowledge based economy. The KAM consists of 109 structural and qualitative variables to measure countries performance in the four pillars of the Knowledge Economy (KE): Economic and institutional regime, education and skills, information and communication infrastructure, and innovation system.

For the current study we have selected eight variables from the fourth pillar (Innovation system) of the KE to make a RIS analysis model (Table 2) as a guideline for more comprehensive innovation system assessment in Iran.

Table 2. RIS Analysis Model.

Drivers of Innovation	Performance of Innovation
R&D Expéditeurs	High-tech industry
Venture Capital	Scientific Publications
R&D Personnel	Patents
Tertiary Enrolment	Firm Level S&TAbsorption

Drivers of Innovation

R&D Expenditures

In early 2000s, Iran allocated around 0.6% of its total GDP to the R&D (see Figure 5), which amounted to around 2.5 billion USD. In 2008, this rate reached 0.79% ranking Iran among top 25 countries (Table 3). It is worth mentioning that 89.4% of GERD is carried out by the government and higher education sectors while business enterprises perform only 10.6% of GERD (UNESCO, Science Profile & Science Report 2010). In 2008, 61.6% and 7.4% of all research funding was the cost of government and higher education funding, respectively. In the developed countries, business enterprises are the main R&D performers (Figures 6 and 7).

Table 3. Gross domestic expenditure on R&D in Iran and selected countries.

N	Country	GERD in '000 current US $	GERD as % of GDP
1	**USA**	**398194000**	**2.77**
2	**Japan**	**148719235**	**3.44**
3	**China**	**121369732**	**1.47**
4	**Germany**	**81849382**	**2.50**
5	**France**	**46262320**	**2.02**
6	**Republic of Korea**	**43906413**	**3.36**
7	**UK**	**40096350**	**1.88**
8	**Russian Federation**	**30058385**	**1.03**
9	**Italy**	**24510194**	**1.18**
10	**Canada**	**23887912**	**1.84**
11	**Brazil**	**21649413**	**1.08**
12	**Spain**	**20434838**	**1.34**
13	**Australia**	**18754994**	**2.35**

14	**Sweden**	**13448857**	**3.75**
15	**Netherlands**	**12419182**	**1.63**
16	**Switzerland**	**10512662**	**3.00**
17	**Israel**	**9427258**	**4.86**
18	**Austria**	**8868194**	**2.66**
19	**Belgium**	**7737272**	**1.92**
20	**Turkey**	**7712388**	**0.72**
21	**Finland**	**7472887**	**3.46**
22	**Singapore**	**6605896**	**2.61**
23	**Iran**	**6465238**	**0.79**
24	**Denmark**	**6225180**	**2.72**
25	**Norway**	**4733333**	**1.62**

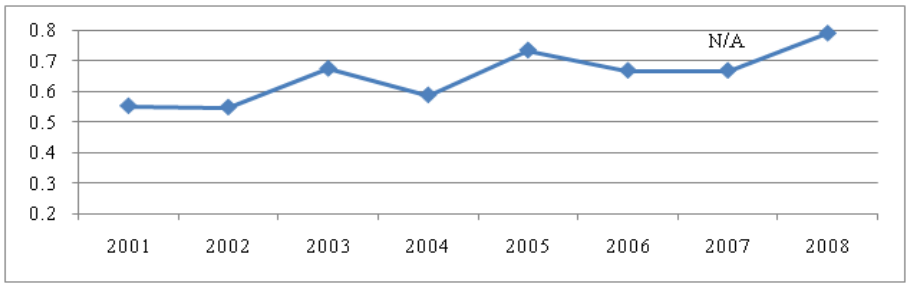

Figure 5. GERD as a Percentage of GDP in Iran.

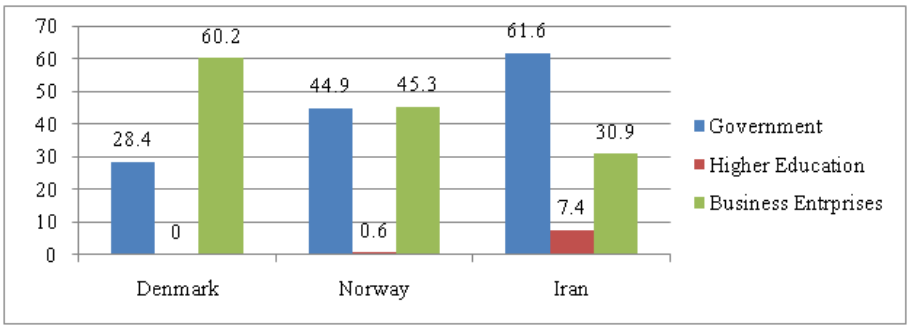

Figure 6. GERD by source of funds in Iran, Norway and Denmark in % of total, 2008.

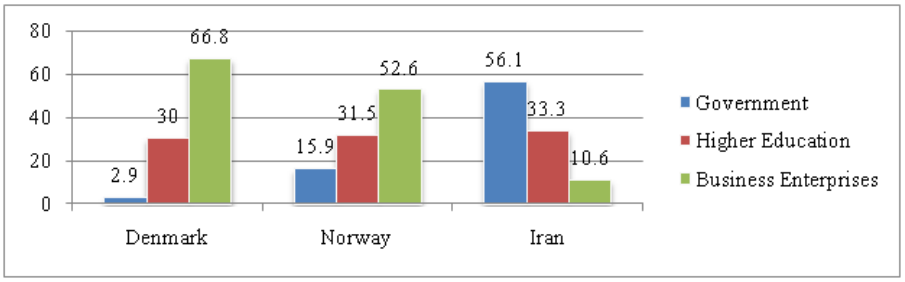

Figure 7. GERD by sector of performance in Iran, Norway and Denmark as % of total, 2008.

Venture Capital

Since innovation is a risky endeavour that many firms and other institutions cannot afford to engage in alone, appropriate financial institutional infrastructure must be in place to foster business development and technological innovation. Banking and financial reforms, capital markets and financial incentives from the government can all play a role in creating the financial capacity to make businesses and the economy more innovative (Juma and Serageldin, 2007; OECD, 2007).

Venture capital availability in Iran is very limited. According to the World Bank Global Competitiveness Report (2010-2011), the rank of Iran was '133' out of '139' in terms of the venture capital availability. The major sources of venture capital at reasonable rates are budget-directed funds, IDRO's venture fund and bank loans. The Bank of Industry and Mines is the main provider of funds for start-ups and expansion projects with the mission to encourage and promote establishment and expansion of industrial, mining and high-tech enterprises (UNIDO 2003). In 2007, that fund represented a 41% increase as compared with the previous year (BIM, Annual Report 2008).

Industrial Development and Renovation Organization of Iran (IDRO), plays major role in promoting industrial and technological capabilities of the country by establishing new high technology companies. Ministry of Industries and Mines has invested over USD 161 million for implementing high-tech projects during the past eleven years (IDRO, 2011). Iran has the lowest rank among all the developing countries of MENA region in terms of venture capital availability.

R&D personnel

In spite of the brain drain, poor political relationship with the West, Iran's scientific society keeps being productive (Mohebbi and Mohebbi, 2006). In 2006, Iran had the 16th highest number of researchers in the world, behind the Netherlands, and ahead of Turkey. In 2008 it rose to the 14th place becoming ahead of Sweden, Netherlands and Turkey (Figure 8).

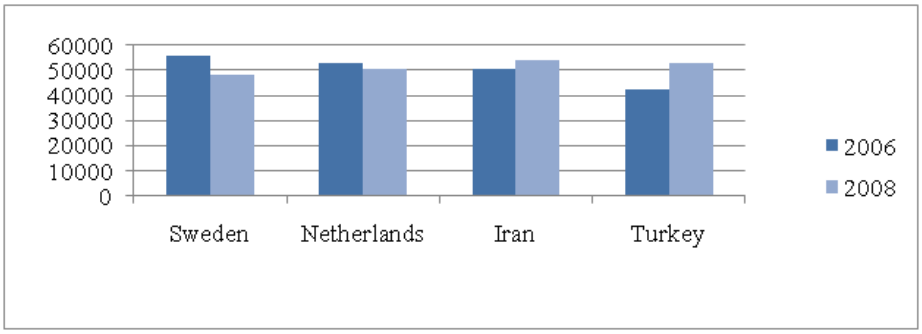

Figure 8. Number of Researchers in Iran and Selected Countries (FTE).

A considerable number of the total researchers in Iran is employed in the government and higher education sectors. The enterprise sector, where commercialization of research is most effective, includes around 15% of Iran's total researchers (Figure 9).

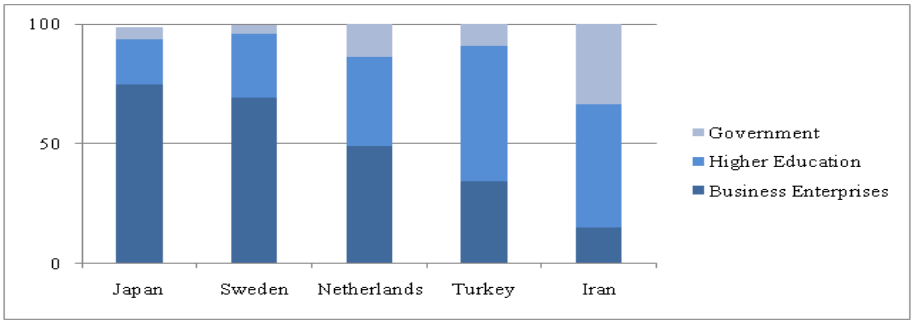

Figure 9. The number of researchers in Iran and selected countries by sector of employment (in % of total), 2008.

Higher education enrolment

The higher education sector not only contributes to S&T development through its direct participation in various S&T activities, but also through its education mission, which ensures a future supply of human resources for S&T (OECD, 2009). For the past 30 years, Iran has been expanding its university admission capacity. By the turn of the century, universities had a capacity of about 160,000 students. By 2009, this number had risen to 1,500,000 students. The number of enrolments and graduates in higher education institutions nearly doubled between 2003 and 2009 (Figure 10).

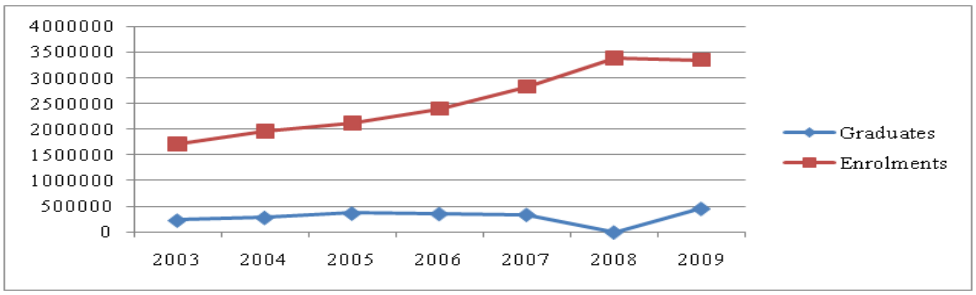

Figure 10. The number of enrolments and graduates in tertiary institutions, 2003-2009.

Science, engineering and business students are core inputs for innovation. Highly innovative countries foster science and engineering student populations as part of their growth strategies. Iran does not fall far behind the innovative countries such as the United Kingdom and France in terms of higher education enrolment. The number of students enrolled in science, engineering and business is even higher than that of the mentioned countries (Figure 11).

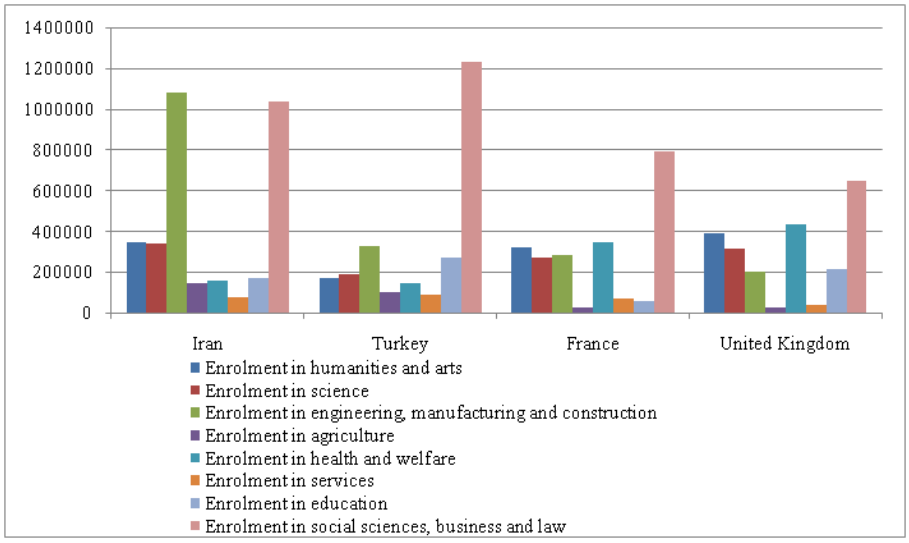

Figure 11. Enrolment number by field of study in Iran and selected countries.

Performance of innovation

High tech exports

All industries generate and/or use new technologies to some extent. However, some are more technology-driven than others. To determine the importance of technology, it is useful to focus on the leading producers of high technology goods, on the activities that involve intensive use of high technology and have highly skilled workforce to benefit from technological innovations.

Iran has made remarkable progress in high-technology manufacturing during recent years. Iran's government invests huge funds in the research and development of high technologies. The high-tech manufacturing in Iran made great strides in aerospace, biotechnology, computers and robotics, nuclear physics and telecommunications.

The computer manufacturing in Iran is active in the sectors of microelectronics, electronic appliances, computer hardware, smart cards and telecommunications devices. The main exporters to Iran are South Korea, Germany, Japan and France with European companies mainly active in exports of telecommunication devices, while all the components used in the industry, except chips and drives, are produced domestically. Around one million PCs are sold annually. This market is worth around USD 700 millions and grows at an annual rate exceeding 30%. The electronics and hardware industry generates 0.5% of GDP. Over the past ten years, it has experienced steady growth and is expected to grow even faster with the adequate government support and proper policies.

There has also been tremendous growth in pharmaceuticals production. In 2009, 29.5 million units of pharmaceutical products valued at USD 1.9 billions were produced in Iran. Exports have also grown by an average of 15% per annum over the past decade. With a 33% average gross margin, Iran has one of the most developed and profitable pharmaceutical industry in the world (Turquoise Partners, 2010).

Iran’s IDRO has established and developed companies in different fields with the aim to promote domestic and foreign investment in high-tech and export-oriented industries. These high-tech areas include ICTs, microelectronics, advanced materials, life sciences, biotechnology, electronics, and nanotechnology.

In spite of the recent achievements in high-technology industry, Iran is still far behind not only the industrialized but also other developing countries in terms of high tech exports (Figure 12). A significant part of the output of high-technology industries consists of ICT goods. The export of ICT goods in Iran is also very low as compared with the other developing countries. It is even lower than exports of Pakistan, Egypt, and Saudi Arabia (Figure 13).

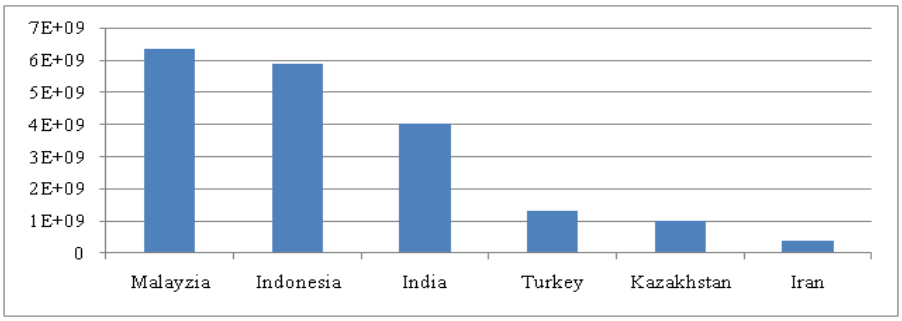

Figure 12. High technology exports in Iran and other developing countries, 2006 (Current US$).

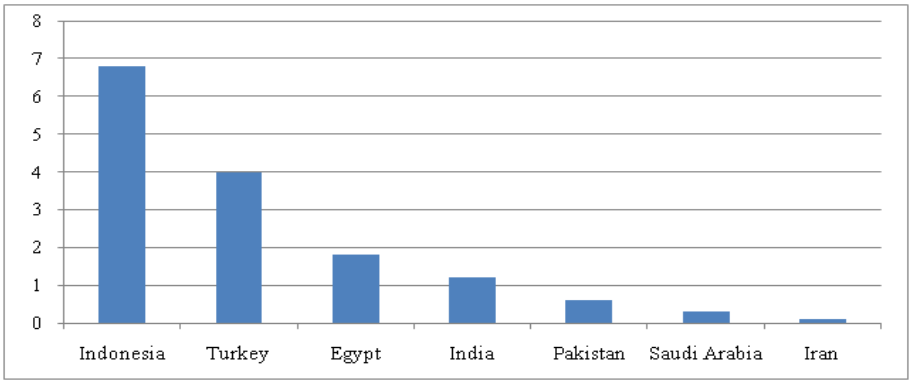

Figure 13. ICT goods exports in % of total goods exports, 2006.

Scientific Publications

The expansion of higher education in general and graduate studies in particular has in turn improved Iran's standing in international journals. The number of Iranian articles published in the natural and social sciences and engineering rose by 123% between 1995 and 2005, according to Thomson Reuters' Science Citation Index (SCI). Among the main fields of science, Iran is currently most focused on the field of engineering, as reflected by the 7,500 papers published in Thomson Reuters indexed journals from 2005 to 2009, comprising 1.71% of papers published in this field. Iran's next-highest research output is in Chemistry, at 1.68%, followed by Materials Science, at 1.19% (Figure 14).

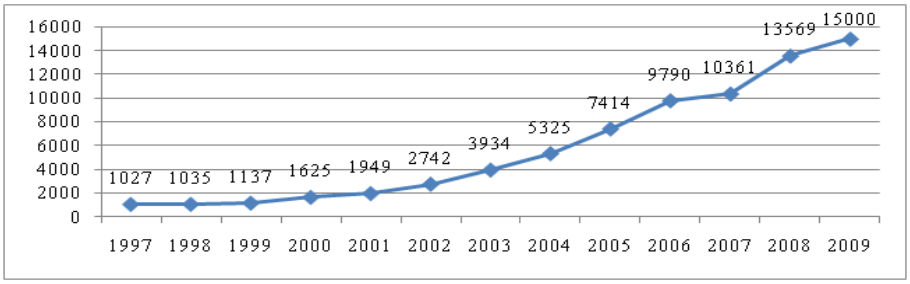

Figure 14. Articles published in international journals by Iranian scientists, 1997-2009.

More than half of the scientific publications of OIC member countries come from Turkey and Iran (Figure 15). International collaboration as measured by scientific articles has also increased markedly from 313 in 2000 to 2,208 in 2008.

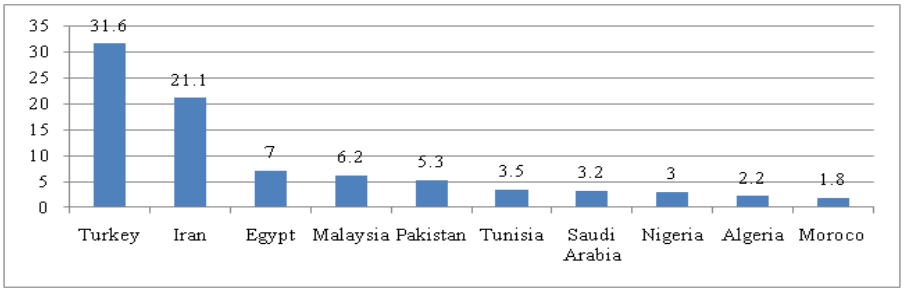

Figure 15. OIC member countries by number of published articles in % ot total, 2009.

Patents

Patents are a useful measure of innovation. Patent applications are significant factors for the degree of innovative capability in a country (OIC 2010). Iran made great strides in terms of patent applications during the recent years. The number of patent applications increased more than 10 times and patent grants more than 18 times from 2000 to 2006 (Figure 16).

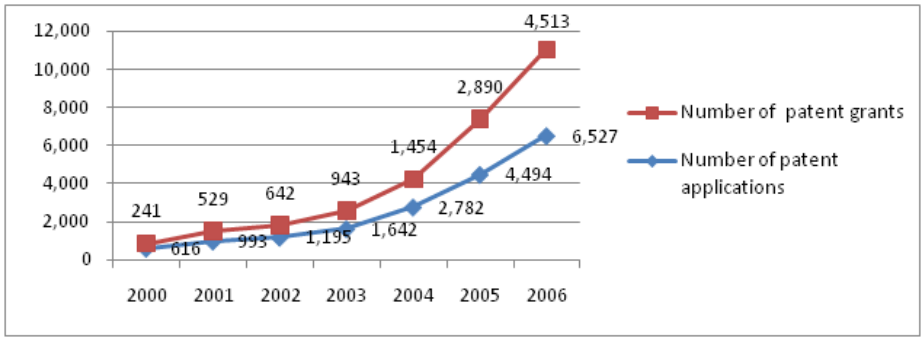

Figure 16. Patent applications and grants (resident and non-resident), Iran.

Although Iran has the highest number of patent applications among MENA region countries, it lags behind other developing countries such as India and Brazil (Figure 17). According to the United States Patent and Trademark Office and WIPO, Iran was granted twenty patents by the US from 2007 to 2010 and three patents by European

Patent Office from 2007 to 2009. These figures ranks Iran far behind not only technology leaders but also emerging economies such as Egypt, Turkey, Malaysia, Thailand and Saudi Arabia (Figure 18).

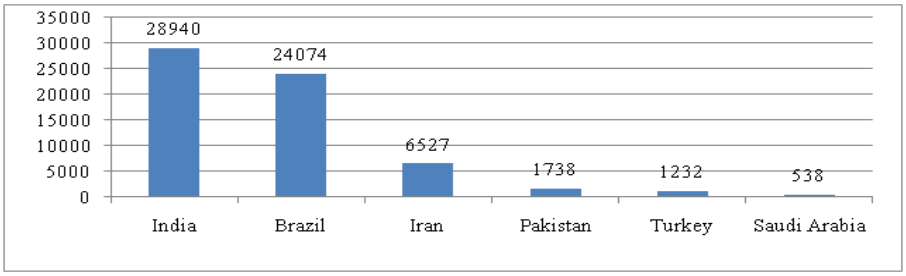

Figure 17. Patent applications in Iran in comparison with the other developing countries, 2006.

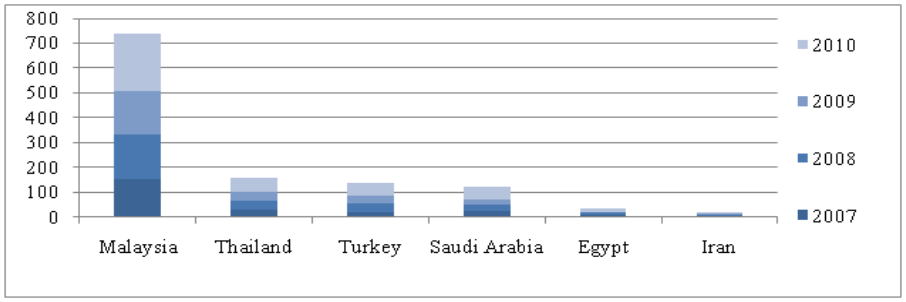

Figure 18. US patents issued to Iran in comparison with the selected emerging economies.

Firm Level S&T Absorption

Enterprise sector, which mainly consists of SMEs, is very weak with minimal S&T capabilities in Iran. Iran was ranked the 116th according to the World Bank Global Competitiveness Index (2010-11), suggesting that the ability of Iranian firms to absorb new technologies is very low. The access to science and technologies is hampered by the government domination of R&D. The number of researchers employed in the enterprise sector in Iran was twice less than that of the government sector in 2008. This number is considerably different from that of Turkey and other innovative countries, where the overwhelming majority of researchers are employed by the enterprise sector (Figure 19).

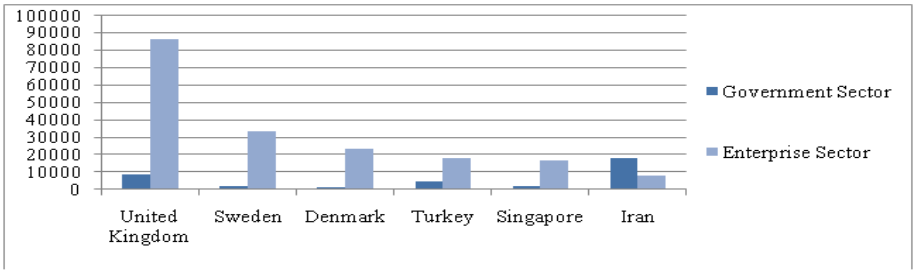

Figure 19. The number FTE researchers in the government and enterprise sector in Iran, Turkey and innovative countries, 2008.

From 2006 to 2008, the number of researchers in the enterprise sector in Iran increased by only 1%, whereas in the government sector by 13%. During the same period, the GERD performed by the government sector in Iran increased by 39.3%, whereas by the enterprise sector by 2.6%. GERD performed by the enterprise sector in Iran was more than five times lower than that by the government sector in 2008 (Figure 20).

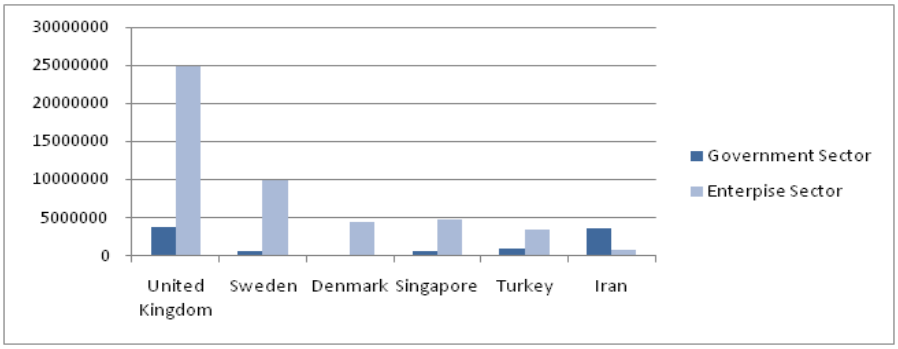

Figure 20. GERD performance by enterprise and government sectors in Iran, Turkey and other innovative countries, 2008.

The cooperation between universities and companies is one of the best ways to engage enterprises in innovative activities. However, as it is defined by the World Bank Global Competitiveness Report (2010-2011) university-industry collaboration in R&D is also very weak in Iran.

Conclusions and Suggestions

The article aimed to analyse the innovation system in Iran based on the comparison of the developing and developed countries. The summary of the main findings of the study is used below to make suggestions, which could provide useful information for policy makers to develop strategies for enhancing innovation system in Iran.

Iran has one of the largest oil and gas resources in the world, which can provide the fiscal resources to enhance its innovation system to the level of developed countries. According to the latest available statistics, Iran R&D expenditure was more than that of Denmark and Norway, whereas, in terms of the number of researchers, it exceeded Sweden, Netherlands and Turkey. However, Iran is far less innovative than Denmark, Norway, Sweden, and Netherlands. According to the World Economic Forum report (2010-2011), the innovation rank of the mentioned countries was ten, 16, five and 13 respectively, whereas Iran's rank was 66 followed by Turkey (67).

The strength of innovative countries is in the strategy that most of R&D activities and workforce are concentrated in the enterprise sector. This strength of innovative countries is the major weakness of Iran, where government and higher education sectors are the main actors in the R&D, hindering the S&T access to SMEs. The government dominance of R&D is reflected in the low level of high-tech exports and foreign patents. The high technologies manufactured in Iran as well as Iran's inventions, the number of which increased rapidly in the recent years, are not oriented to global markets. The overwhelming majority of Iran's patents are filed with the Iranian patent office. This implies that these inventions can be commercialized only in the domestic market. Filing patents in the U.S. implies a more global perspective from the inventor's viewpoint as U.S. patents generally include innovations that are new to the world.

The R&D conducted in the business sector is more likely to be successfully commercialized since its incentive structures are more profit-oriented, and businesses tend to have more practical marketing and production experience than research institutions.

There are several policy instruments to help firms to innovate. One of them is to provide financial support for innovation and R&D projects in new and existing firms. This type of instrument in particular targets lack of real risk capital (angel, seed or venture capital) for innovation activity in SMEs. Another common type of instrument includes technology and knowledge centres that support technology diffusion and innovation in SMEs and build networks between firms. This instrument is geared towards the problem of a limited resource base in many traditional SMEs. A third type of instrument is the upgrading of regional innovation systems. This instrument can supplement the other four main policy instruments, which focus on individual firms or projects. A fourth type of instrument

consists of proactive innovation brokers. Generally, SMEs find it difficult to identify and articulate their own support needs. Brokers can assist them in identifying their needs of innovation projects and in making contact with relevant knowledge organisations. This instrument may be directed towards several possible innovation barriers such as limited technological competence, lack of market research and limited strategic vision, depending on specific barriers in individual firms, the brokers' knowledge and experience and the specific activities the brokers examine. It may be particularly relevant to stimulate low-innovative firms to start becoming more innovative. The last innovation policy instrument consists of mobility schemes. Mobility schemes are directed towards the problem of recruiting higher educated persons to SMEs and limited technological competence in the enterprises. Some of the most effective means of promoting a demand for knowledge, and thus technology transfer, in SMEs involve strengthening the human resource base of the firm, such as by stimulating the employment of graduates in SMEs. Mobility schemes recruit an expert (e.g. a university candidate) for an SME for a specific period. The expert works with a specific innovation project in the enterprise or contributes to technology diffusion and in strengthening the contact and cooperation between the firm and R&D institutes and higher education institutions (ECSPF, 2010). Increasing higher education enrollment implies increased quantity and scientific quality of human capital and thus, a greater capacity to conduct R&D. As it has been already mentioned, Iran's higher education enrollment doubled from 2003 to 2009 exceeding the enrollment rate of the UK and France in science, engineering and business. With the increase of the higher education enrolment, the number of scientific published work also increased immensely, 13 times from 1999 to 2009, in which the number of engineering articles increased by 30%. The Royal Society (2011) has reported the growth of scientific publications in Iran as the fastest in the world. Iran would have more success in scientific achievements with such rapid growth, if it improved the quality of higher education. Though the policies for S&T in the *Fourth Development Plan* (2005–2009) included development of the higher education system, research centres, basic science and applied research, education and training of researchers and university professors, the fact that higher education and training rank in Iran is 87 (WEF, 2010-11), indicates that these policies were not satisfactory.

If the knowledge produced in Iran were harnessed in smart and constructive ways, it would develop more rapidly into innovation driven economy with low unemployment and poverty rates and reduced brain drain.

RESEARCH LIMITATION

Because of the lack of up to date data in most of the selected fields related to Iran, this research only covers the period until 2010.

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