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# AN OVERVIEW OF THE INNOVATION SYSTEM IN IRAN

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**Alireza Ansari Vaghef**
**Prof. Dr. Utz Dornberger**
**Henrik Beermann**

**Fraunhofer Center for International**
**Management and Knowledge Economy IMW**
**Neumarkt 9–19, 04109 Leipzig, Germany**
**www.imw.fraunhofer.de**

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# Contents

# 1 Summary

This study analyzed the four pillars of the National Innovation System (NIS) (government, education and research system, transfer organization, and industry) in Iran as well as the linkages within the system and linkages with international actors.

The education and research system is the most developed pillar of the country's NIS. Despite a decrease in public expenditure, the country has advanced significantly in research and education in terms of number of graduates (especially in engineering and the natural sciences), number of education providers, and number of research activities (scientific publications) and facilities. Nevertheless, there is a need to improve the quality of education and research particularly in the area of applied research. Furthermore, high levels of brain drain can be a challenge as it causes reduction in the quality of human resources in the system.

The Iranian industry consists largely of small and medium-sized enterprises (SMEs). High-tech firms have a relatively small share in the economy. During recent years, the research and development (R&D) expenditure has fluctuated several times. Nevertheless, the R&D activities (e.g., patent applications) have increased. R&D activities and budgets are mostly targeted at the acquisition of technology from international providers in order to fill the technology gap for the Iranian enterprises. In addition, developing the absorptive capacity of the Iranian firms is vital, as it can lead to a higher performance and increase in innovation efforts.

Transfer organizations (especially private firms) are growing rapidly in the NIS. However, their service portfolio is limited to some financial, networking, and co-working space support. Not many of them offer capacity development or technology management services (e.g., technology assessment, etc.). The main venture capital investment is in the IT, life sciences, and nanotechnology sectors.

Innovation linkages (especially university-business linkage) in the Iranian NIS are relatively weak for various reasons. The post-sanction era has provided a chance for the NIS actors to develop more cooperation with international actors in order expand their capacities and resources.

In our research we discovered that the Iranian diaspora (as highly educated and wealthy emigrants) are eager to support the country's NIS. Furthermore, their cultural ties and empathy for the development of the country could act as pull factors in the initiation and development of cooperation between the diaspora and Iranian NIS actors.

In the past decade, the Iranian government has issued several macro policies and adjusted its organizational structure, which has led to improvements in the NIS. However, the existence of some parallel organizational structures and a lack of interaction between them reduced the efficiency of policy design and implementation.

# 2
# Introduction

Innovation usually does not occur in isolation and in fact requires the cooperation of several actors. In order to facilitate the innovation process, each actor plays a role and interacts with other actors. Such interactions and functions create the so-called 'Innovation System'. Development of the National Innovation System (NIS) is one of the key issues for a country's policy makers. This study will give an overview of the Iranian NIS.

Iran is a developing country that has high levels of educated population. Between 2013 and 2014, approximately 860,000 students graduated from Iranian universities (IRPHE, 2016). Moreover, the strong emphasis placed on engineering and the natural sciences make the country's education system unique worldwide.

Iran has a resource-based economy and therefore, certain clusters (e.g., oil and gas) have been significantly developed. In addition, the lack of international collaboration and technology exchange has forced its industry to rely on local suppliers and indigenous innovation efforts. However, the recent opening of the country has provided a unique opportunity for industry to engage in more international activities.

This study aims to describe the country's NIS comprehensively. The research presents the actors of the Iranian NIS and their function in the system. In addition, the study examines the linkages within the system and the role of the diaspora in developing the country's NIS.

# 3 Methodology

## 3.1 Research Design

This work defines innovation system according to the system theory (Carlsson and Stankiewicz, 1991; Carlsson et al. 2002; Edquist 2005) as a set of actors (components), their functions, and the relationships between the actors (national and international linkages). This research aims to analyze all four variables in order to give a comprehensive overview about the system (see Figure 1).

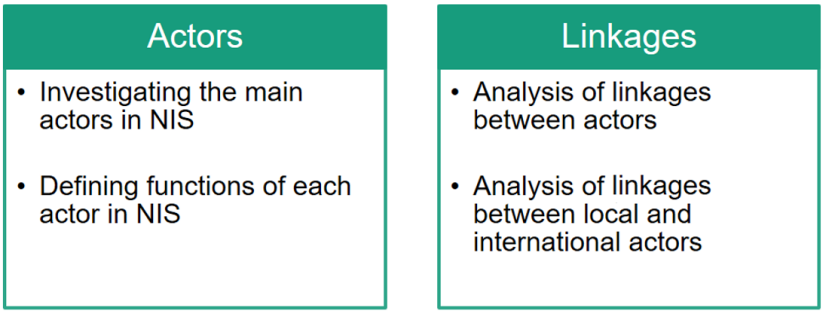



**Figure. 1 Research Design**

The research was conducted in three phases. In the first phase, the pillars of the innovation system were defined and different actors of the Iranian NIS in each pillar were investigated. In the second phase, the functions of each actor were analyzed. In the last phase, relationships between the actors were defined and opportunities for development of international linkages were discussed.

## 3.2 Data Collection and Analysis Methods

In this research both secondary and primary data were collected and analyzed. The following methods were used in the data collection:

- *Desk research:* The majority of secondary data was gathered through desk research from international and Iranian publications.
- *Group discussion:* During the study, two group discussions were held with Iranian researchers in Germany.
- *SWOT analysis:* During the group discussion, the SWOT analysis tool was used. The collected data were used to identify the key actors and institutions in the Iranian NIS and the linkages between the actors in the innovation system.

## 3.3 Limitations

This research tries to provide a comprehensive overview on the Iranian NIS. Nevertheless, some limitations do affect the research results.

One limitation of the study was that due to the research timeframe, the diaspora from whom the data was collected was limited to Iranian researchers in Germany. This might cause a bias in the data, as it does not reflect the opinions of all Iranian diaspora.

The second limitation is the lack of detailed objective data regarding specific sectors. Most studies on the Iranian NIS focus mainly on the oil and gas, petrochemical, or biotech industries. However, not much data are available on innovation activities in other industries (such as the automotive industry, which is the second largest employer after oil and gas and petrochemical).

Last but not the least, due to the time frame of the research, the linkages were analyzed subjectively. Future studies could use network analysis tools in order to analyze the linkages in more depth.

# 4
# Iranian National Innovation System

An innovation system consists of different actors who interact with each other in order to generate knowledge, transfer it to the other actors, and produce an innovative product or service. One of the main approaches in defining such systems is the triple-helix approach, in which the research and education system (universities, research institutes, etc.), government, and industry are the main players (Etzkowitz and Leydesdorff, 1995). Nevertheless, the triple-helix approach does not clearly define the role of intermediaries. Intermediaries play various roles in an innovation system, for instance providing transfer services and thus facilitating knowledge transfer between the actors or supporting actors to develop their capacityby providing support in innovation management, etc. (Howells, 2006). Hence, it is necessary to consider intermediary organizations as one of the main actors in an innovation system.

This work considers four pillars (research and education system, industry, government and transfer organizations) in analyzing an innovation system (see Figure 2).

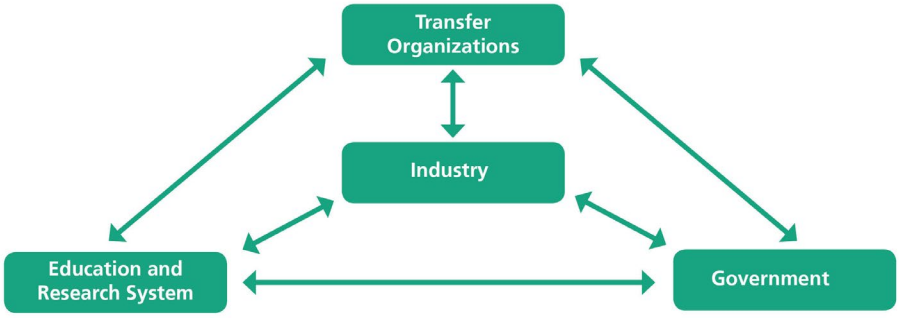



**Figure. 2 Innovation System Elements**

This chapter describes each pillar of the Iranian NIS, the national actors in each pillar, and the function that each actor plays within the NIS.

## 4.1
## Government

### 4.1.1 NIS Development Strategies

In 2003, the Iranian Parliament approved a national project called 'Horizon 1404' Hejri-Shamsi (2025 A.D.)[1]. The project was advanced by the Expediency Discernment Council as the country's main long-term development program and it was divided into four smaller development projects which each lasted for five years.

The main objectives of the 'Horizon 1404' project regarding research and innovation are (Supreme Council for Cultural Revolution, 2011):

[1] In this text we use the term 'Horizon 2025' for this project.

- *"Achieving first position in science and technology in the Islamic world, and attaining an advanced scientific and inspiring status in the world.*
- *Establishing a knowledge-based and justice-oriented society, possessed of competent enlightened, and elite individuals, with a view to becoming a scientific authority in the world.*
- *Deepening and expanding of general and specialized education, and strengthening of morality, free-thinking, and spirit of innovation throughout the society, particularly among the youth.*
- *Attaining scientific development and modern and beneficial technologies in line with the priorities, needs, and relative advantages of the country; and their dissemination and application in various educational, industrial, and service institutions.*
- *Increasing the share of goods and services produced based on domestic science and technology to a level exceeding fifty percent of the gross domestic product (GDP).*
- *Promoting the status of Persian language among international scientific languages.*
- *Bolstering the promotion of science and technology in the Islamic world, and reviving the pivotal and historical status of Iran in the Islamic culture and civilization.*
- *Expanding cooperation in the fields of science and technology with major international scientific centers."*

In order to achieve the aforementioned objectives, a National Master Plan for Science and Education was developed. The master plan aimed to provide a clear roadmap for Iranian Science and Technology (S&T). The following table summarizes the main macro indicators of the plan.

| Category | Indicator | Sub-Indicator | Goal for 2025 |
|---|---|---|---|
| Human Capital | Percentage of national education coverage | ▪ Elementary school<br>▪ Secondary school | 100 %<br>95 % |
| | Gross level of enrollment in higher education (ages 18 to 24) | | 60 % |
| | Share of post-graduate students vs. total university students | | 30 % |
| | Share of PhD students vs. total university students | | 3.5 % |
| | Percentage of fulltime researchers | ▪ Government<br>▪ Universities and research institutes<br>▪ Private sector and NGOs | 10 %<br>50 %<br>40 % |
| | Number of full-time university faculty members per one million population | | 2000 |
| Scientific Publications | Number of articles per one million population | | 800 |
| | Number of citations per publication | | 15 |
| | Ratio of university and seminary graduates to indexed articles in international indices | | 10 |
| | Ratio of indexed articles on the international level to the number of university faculty members | | 40 |
| | Number of journals with major international index (effective factor of over 3) | | 160 |
| Research and Innovation | Number of registered inventions and discoveries | ▪ National<br>▪ International | 50000<br>10000 |
| | Ratio of inventions registered in major international databases to the number of university faculty members | | 0.15 |
| Investments and Funding | Share of education and research costs as a proportion of GDP | ▪ Education<br>▪ R&D | 7 %<br>4 % |
| | Share of the non-governmental sector in research funding | | 50 % |
| International Cooperation | Number of extensively cited articles | | 2250 |
| | Minimum number of universities and research centers in the top 10 percent of the best centers in international rankings | | 5 |
| Impact | Percentage of the per capita annual GDP growth as a result of S&T | | 4 % |
| | Share of production of goods and services based on domestic S&T in the total GDP | | > 50 % |
| | Share of added value of industrial products with advanced and semi-advanced technology in the total manufacturing added value of the country | | 50 % |

**Table. 1 Goals and Key Indicators of Iranian NIS (Supreme Council for Cultural Revolution, 2011)**

### 4.1.2 The Main Public Policy Actors

Various organizations are involved in the formulation and implementation of NIS policies. The organizations mainly responsible for devising policies are: *Supreme Leader, Supreme Counsel for Cultural Revaluation, President, Supreme Council for Science, Research and Technology,* and *Parliament and Judicial system*. Other organizations are involved in policy implementation and monitoring in the system. The following diagram provides a comprehensive overview on the main players in Iran's NIS.

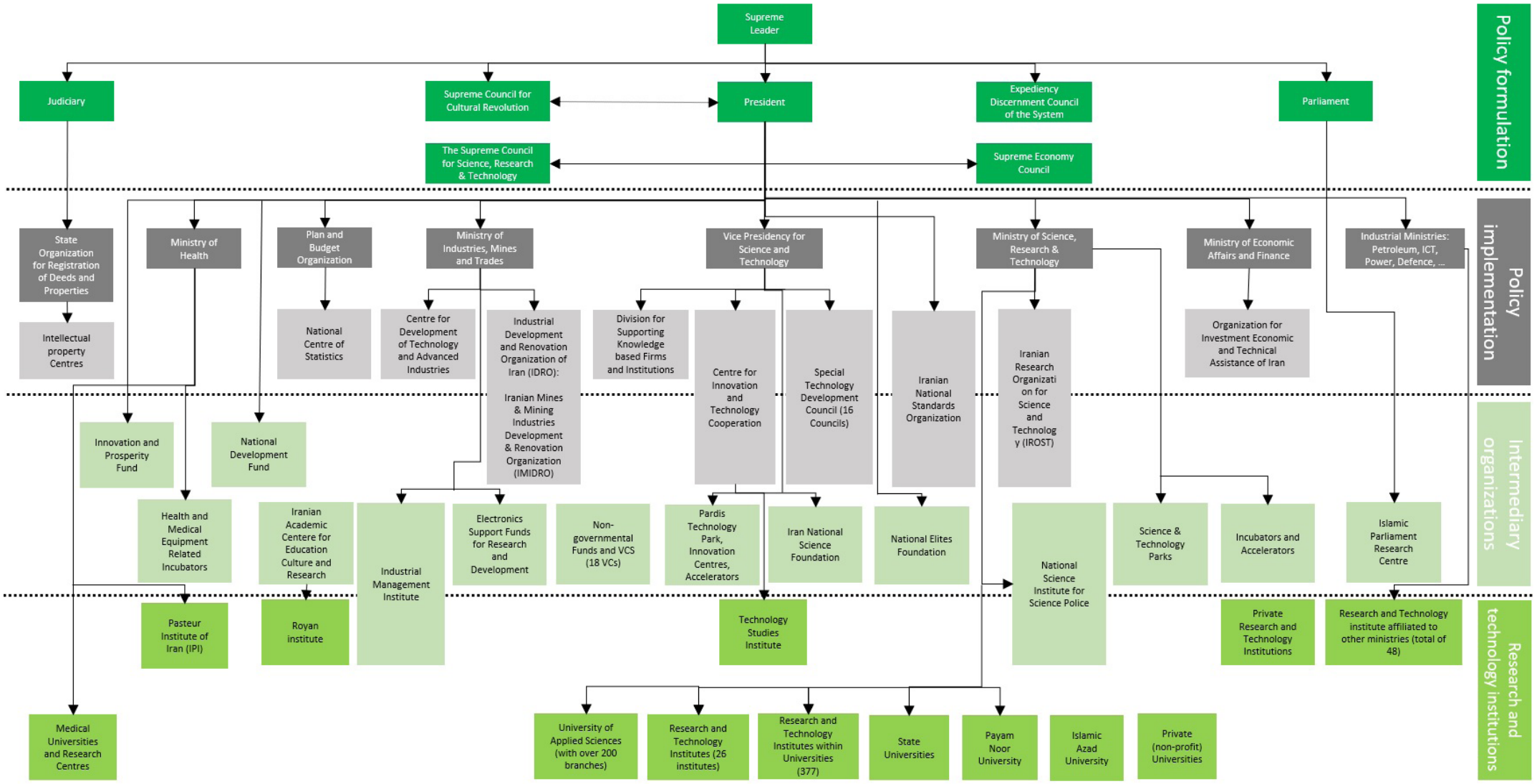



Figure. 3 Iranian NIS actors (UNCTAD, 2016)

*The Management and Planning Organization (MPO):* has various roles. It is responsible for designing, allocating and monitoring national budget act policies, evaluating and monitoring the implementation of Horizon 2025, defining standards in public management, etc. To do so, the *Statistical Center of Iran* (affiliated to MPO) supports MPO in evaluation and monitoring policies. The *Research and Training Center for Development and Foresight* (former *Governmental Management Training Center)* as another sub-organization of MPO, offers education and capacity building for human researches in governmental organizations. This center is also mandated to design and implement development and process optimization plans of the governmental organizations.

*The Iranian Vice-Presidency for Science and Technology (VPST):* which was established in 2007, aims to promote development of high-tech entrepreneurship via 16 technology development councils. Furthermore, the VPST established the '*Pardis Technology Park*' and supports intermediary organizations (private incubators, accelerators, venture capitals, FDI, etc.) to engage more in the development of the NIS. In 2010, the Iranian Vice-presidency also developed the so-called *Innovation and Prosperity Fund* (IPF), the largest innovation fund in the county. In 2011, the IPF started its activities with a budget of about USD $300 million (IPRC, 2012) and the budget has increased slightly since then. The IPF aims to provide support to knowledge-based start-ups, sponsor their knowledge and technology transfer projects, and support the establishment of private (and public) incubators, a high-tech entrepreneurship center and accelerators.

*The Iran National Science Foundation (INSF):* was founded in 2003 with the approval of the *Supreme Council of Cultural Revolution.* The INSF is an independent institute that aims to support research, scientific cooperation (nationally and internationally), and research commercialization. In this regard, the INFS offers national and international fellowship programs, research funding, support for scientific events, and international patent application. The INSF has recently started activities supporting the establishment of an innovation center and the commercialization of applied research.

*The Ministry of Science, Research and Technology (MSRT):* is the main actor in education and research policy design, implementation and monitoring. The majority of Iranian public universities are affiliated to MSRT. *Institute of Research and Planning in Higher Education (IRPHE)*, *National Research Institute for Science Policy* and *Iranian Research Organization for Science & Technology (IROST)*, as affiliated organizations of MSRT, are the main responsible bodies for implementation and monitoring policies regarding research, technology development and capacity building for universities or higher education institutes. Moreover, the majority of public S&T Parks, incubators and accelerators are affiliated to this ministry.

*The Ministry of Health and Medical Education (MOHME):* is another main actor in the implementation of NIS strategies. MOHME is responsible for implementing policies and monitoring education, research, and technologies in the medical sciences. The ministry is also in charge of policy making and implementation, issuing certificates, etc. regarding technologies related to food as well as drug products.

*The Ministry of Industry, Mine and Trade (MIMT):* is the main actor that designs, implements and monitors policies related to the industry (including low-tech and medium-tech industries and some high-tech industries), mines, and trade. The main sub-organizations of the MIMT involved in NIS policies are: the *Industrial Development and Renovation Organization (IDRO)*, which supports industrial development in the field of industries; the *Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO)* which supports the development of the mining industry; and the *Trade Promotion Organization of Iran (TPO)* which regulates exports and imports. While the IDRO, IMIDRO, and TPO support low-tech and medium-tech, the *Center for*

*Development of Technology and Advanced Industries* at MIMT provides support for university-industry linkages, high-tech entrepreneurship in advanced industries (mainly nanotechnology and biotechnology) and market entry for high-tech products inside and outside the country.

*Other Ministries:* The *Ministry of Petroleum,* the *Ministry of Energy*, the *Ministry of Communications and Information Technology* and the *Ministry of Agriculture Jihad* have responsibilities to promote S&T (in specific fields) via their applied education and research centers.

*The State Organization for Registration of Deeds and Properties:* is affiliated with the judicial system and is responsible for designing and implementing intellectual property rights policies. Here the Iranian *Intellectual Property Office (IRIPO)* is the main sub-organization that designs and implements policies regarding intellectual property rights and registers national patents and trademarks.

## 4.2 Education and Research System

According to the *National Master Plan for Science and Education*, Iran's landscape in research and innovation funding in 2025 should be (Supreme Council for Cultural Revolution, 2011):

- Share of education and research expenses as a proportion of GDP: education 7 % and research 4 %
- Share of the non-governmental sector in research funding: 50 %

Nevertheless, a gap exists between Horizon 2025 midterm plans and the current implementation status. Since 2007, public spending on education has decreased from over 4.5 % in 2007 to 2.9 % in 2015 (World Bank, 2016). In addition, research expenditure should have been 3 % of the country's GDP by 2016, according to the midterm plans for Horizon 2025. Nevertheless, from 2011 to 2014 this share dropped from 0.87 % to 0.51 %, respectively (Supreme Council for Cultural Revolution, 2014). After the sanctions against the country were lifted, the research expenditure share on GDP grew gradually to 0.69 % for the following year.

Lack of investment in education and research causes some difficulties for the actors of the education and research system to play their role in the NIS. This sub-chapter aims to describe public and private actors and their roles in education as well as research.

### 4.2.1 Education System

#### 4.2.1.1 Primary and Secondary Education

Iran's education system has faced some changes following the Cultural Revolution (1980–1983). The K-12 education system, in particular, has been adapted several times. According to the last adjustments, the system was shifted from a 5-3-4 format (five years elementary education – three years middle school education – four years secondary school education) to 6-3-3.
Under the previous system (which is still running in secondary and high schools), pupils had to study five years in elementary school followed by three years in middle school. Education after middle school is not mandatory in Iran. Those who wish to continue their

studies must select from among three different school types: *Theoretical* (called '*Nazari*'), *Technical and Vocational* (called '*Fanni-Herfei*') and *Working Skill* (called '*Kar-danesh*'). Each variation lasts for three years. Students from the theoretical school are allowed to select one major from: *Mathematics and Physics, Natural Sciences,* and *Humanities*. If they intend to study at university, they are required to participate in a pre-university course for one year and must then sit the University National Entrance Exam, called '*Konkour*'. Students from the technical and vocational schools mainly study technical courses to prepare to join the job market in different industries. In case they aim to continue their studies, they have the possibility (without participation in the pre-university course and after participation in Konkour) to complete an associate degree (which equates to half of a bachelor's degree). Students opting to study at working skill schools gain specific skills in order to work in certain jobs in the agricultural industry or select services. Like students from the technical and vocational branches, (without participation in the pre-university course and after participation in Konkour) they can continue to study for an associate degree.

In the new system (which is currently running only at the primary education level), primary education lasts one year longer. Moreover, the pre-university course has been omitted. As the new system was launched recently and it is still in the initial stages, there are no enrollments at secondary and high school level yet. However, university entrance regulations will eventually change in order to adapt to the new system. Figure 3 provides an overview of all education stages in the new Iranian education system.

#### 4.2.1.2 Tertiary Education

Higher education in Iran began in the mid-19th century, but the modern higher education system (based on the European university system) was established in the first Pahvali period (1925 - 1979). Since then, the system has been developed and adapted several times (especially after the 'Cultural Revolution'). Tertiary education in Iran is popular amongst the youth. In the academic year 2015-2016, around 4.35 million students (46.1 % female, 54.9 % male) studied in Iranian universities (IRPHE, 2016). Over three-quarters of these students studied an undergraduate degree (associate or bachelor's degree). Private universities play a considerable role in developing knowledge workers for the NIS (see Table 2).

**Table. 2 Distribution of University Students in Academic Year 2015-2016 (IRPHE, 2016)**

| Degree Type | Public Universities | Private Universities | Total |
|---|---|---|---|
| Associate Degree | 446,113 | 376,232 | 822,345 |
| Bachelor's Degree | 1478,361 | 1079,705 | 2,558,066 |
| Master's Degree | 282,607 | 492,159 | 774,766 |
| Doctor of Medicine | 62,453 | 15,562 | 78,015 |
| PhD Degree | 80,872 | 34,319 | 115,191 |
| Total | 2,350,406 | 1,997,977 | 4,348,383 |
| | 54.1 % | 45.9 % | 100 % |

The distribution of university students and graduates grants the country a unique position worldwide. According to a report by the *Global Innovation Index* (GII), Iran ranked as the country with the second highest percentage of graduates in science and engineering, with 46.6 % (Cornell University et. al., 2017). The high proportion of engineers and scientists and acceptable levels of science and education quality (Schwab et al., 2016) could act as a driver to shift the economy from being resource-based to knowledge-

based. Nevertheless, there remains a significant gap between the quality of the education system (especially in management and non-technical sciences) in Iran and the quality of the education system in knowledge-based economies.

#### 4.2.1.3 Technical and Vocational Education

Technical and vocational education is another type of education in Iran – it was developed via an agreement between Iran and Germany in 1907. Since then, different systems have been implemented in technical and vocational education. In principle, the system is divided into degree and non-degree systems. The non-degree system mainly offers short-term to long-term trainings at various levels (from basic to advanced) for job seekers, university students, and employees who are interested in developing their skills in a specific topic. On the other hand, the degree system offers practical education for pupils and university students. The degree system starts from secondary school and continues to higher education (as an associate degree) (see Figure 4). The following figure provides an overview of Iran's education system.

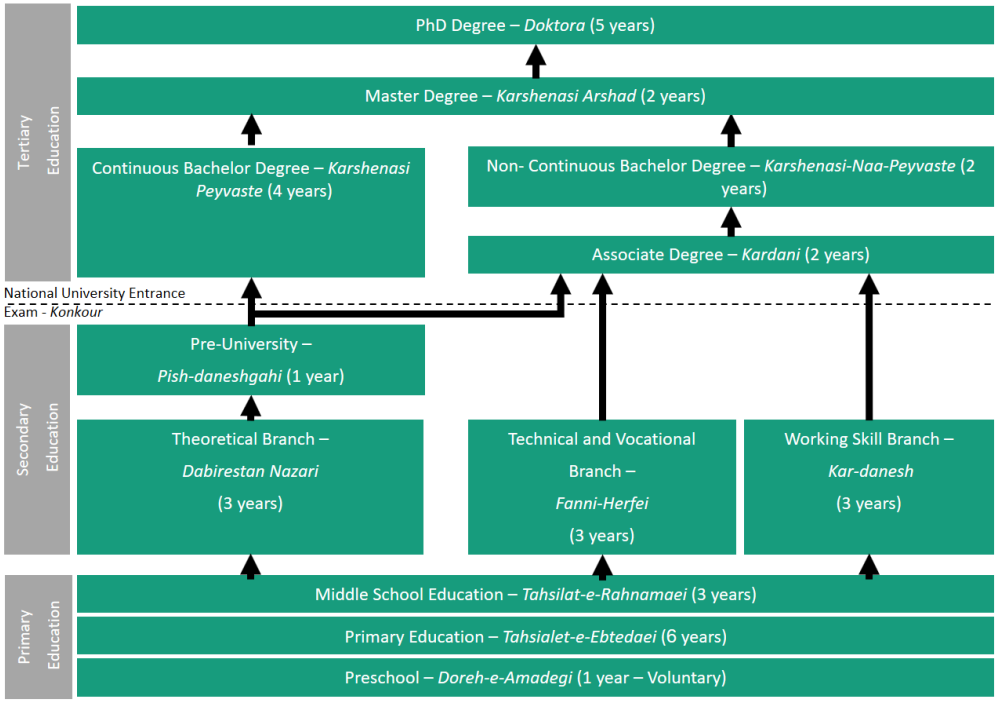



**Figure. 3 Education System of Iran**

#### 4.2.1.4 The Main Actors of the Education System

The chief actors in the primary and secondary education system are limited to public schools affiliated with the *Ministry of Education* and private schools certified by the ministry. The main external cooperation in the primary and secondary education system is the one between Kar-danesh schools and the *Technical and Vocational Training Organization* (TVTO) for providing vocational education.

A different, more diverse set of actors are active in the higher education system than in tertiary education. The public actors are affiliated with MSRT, MOHME, and some other ministries (e.g. *Ministry of Petroleum, Ministry of Energy* etc.) and the private actors are mainly certified by the MSRT.

Actors affiliated to the MSRT are non-medical universities (in total 154 universities) which can be divided into the followings categories: *Comprehensive Universities*, *Technical Universities*, *Universities of Art*, *Universities of Applied Science and Technology* (with over 1,100 branches, responsible for technical and vocational training in the degree system), the *Technical and Vocational University* (with 160 branches, responsible for technical and vocational training in the degree system), *Payame Noor University* (with 531 branches, mainly offering distance learning programs), and *Farhangian University* (with 64 branches and 34-sub branches, responsible for teacher education and human resources development for the *Ministry of Education*). The main private actors in the Iranian higher education system are the *Islamic Azad University* (with 567 branches) and *Higher Education Institutes* or *Non-profit Universities* (ca. 354 institutes). *Islamic Azad University* is the only Iranian university that has international branches (mainly in Africa).

There are about 58 public *Medical Universities* which are affiliated to MOHME. The *Islamic Azad University* (86 medical branches) is the only private sector actor offering medical education in the country.

Although the majority of public universities are affiliated to MSRT or MOHME, some other public organizations such as the *Ministry of Petroleum*, the *Ministry of Defense*, the *Ministry of Agriculture Jihad, MIMT, Central Bank of Iran*, etc. run their own universities or higher education institutes. Nevertheless, these institutes are certified by MSRT (in order to offer a university degree).

### 4.2.2 Research System

The majority of knowledge is produced at universities in Iran. In the academic year 2015-2016, about 115,000 PhD students and ca. 51,900 faculty members were active at Iranian universities (IRPHE, 2016). Iranian research centers and institutes play a significant role, especially in applied scientific advancement in the country.

#### 4.2.2.1 Dominant Research Disciplines

Iran was ranked 16 in the world and first in the Middle East in terms of production of scientific publications (Scimago, 2017). Iran's scientific publications are mainly dominated by engineering and the natural sciences. From 1996 until 2014, the top three domains of research were engineering, medicine, and chemistry. Research in the social sciences fields did not increase significantly (see Figure 5).

In terms of research quality, the top five research disciplines with the highest h-index [1] were: biochemistry, organic chemistry, chemistry (miscellaneous), medicine, and electrical and electronic engineering (see Figure 6). All of Iran's top 30 research disciplines in 2014 belonged to engineering and the natural sciences.

[1] The h-index is an author-level metric and it measures the impact of publication citations as well as their productivity. In order to do so, the index considers both the most cited papers of a scientist and the number of citations that they have received in other publications.

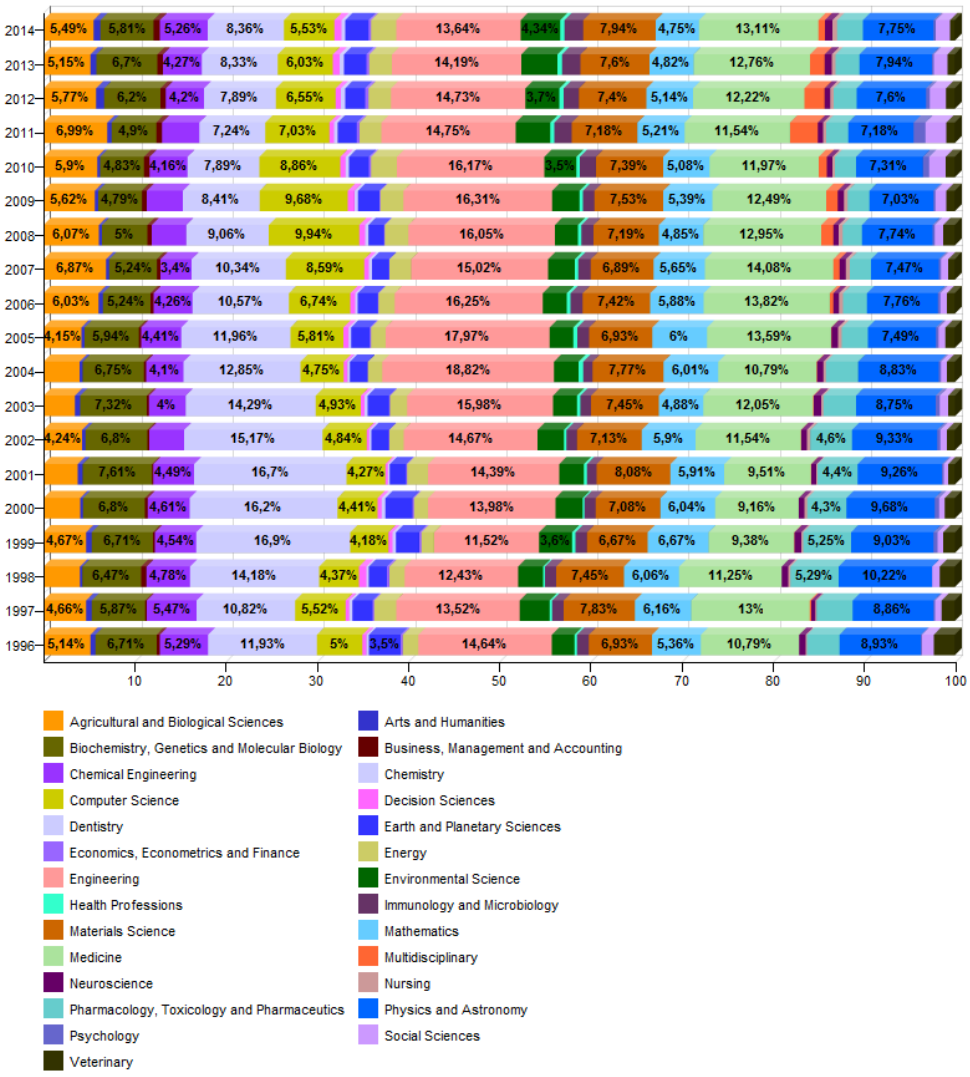



**Figure. 4 Distribution of Iranian Publications in Different Scientific Disciplines (Scimago, 2015)**

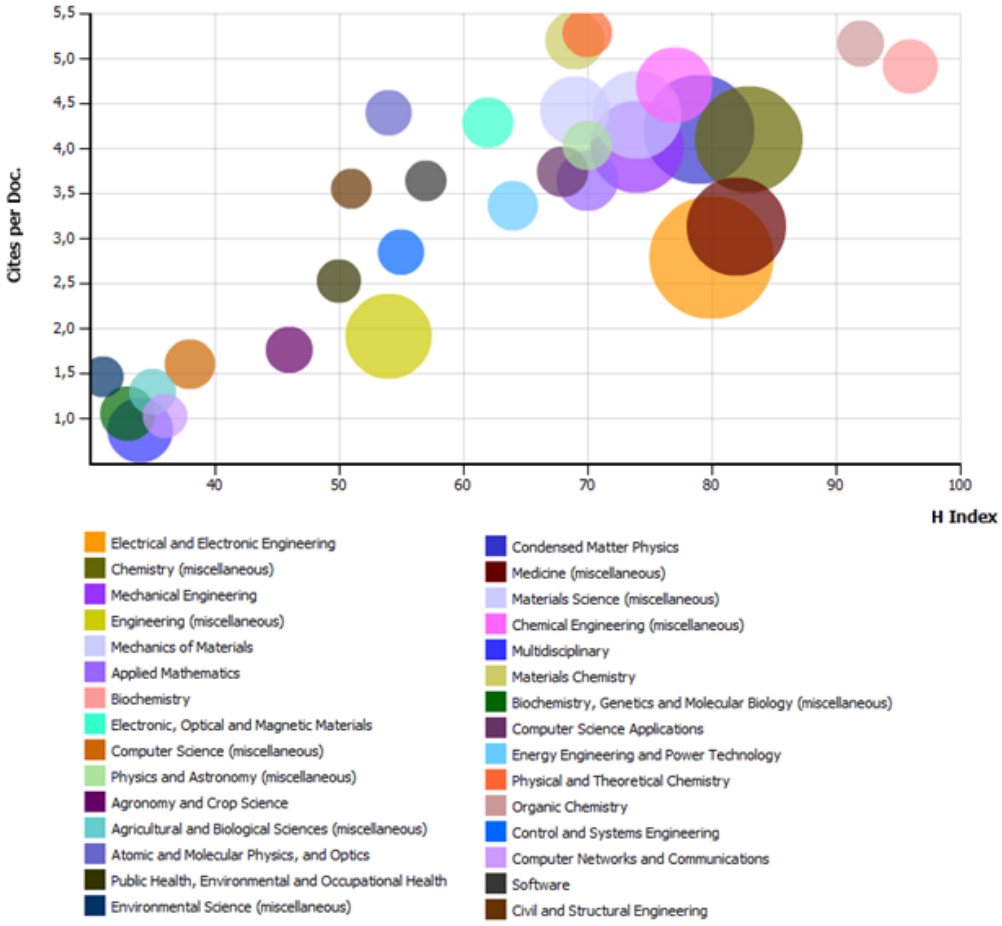



**Figure. 5 Top 30 Research Disciplines of Iran in 2014 (Scimago, 2015**

The high number of publications and good quality of research in engineering and the natural sciences has made Iran competitive in the Middle East. Iran was ranked second (after Turkey and followed by Israel) in terms of number of scientific publications over the period 1996-2015 (Scimago, 2015). Moreover, the country was ranked third (after Turkey and Israel) in terms of the h-index of scientific publications.

The high number of publications has made Iran competitive in the region. Nevertheless, there is a need to improve the research quality (see Figure 7).

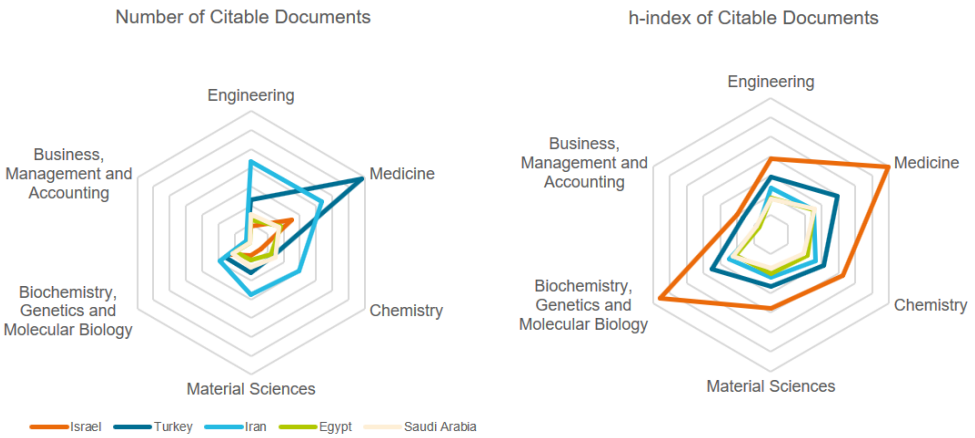



**Figure. 6 Regional Competency of Research in the Top Five Countries in MENA Region (Scimago, 2015)**

#### 4.2.2.2 The Main Actors in the Research System

The research institutes affiliated with the MSRT are the main actors in the Iranian research system. There are 356 research institutes affiliated with the universities, 233 private research institutes, 76 research institutes affiliated with governmental organizations and 21 research institutes affiliated with non-governmental organizations (UNCTAD, 2016). The main actors of the Iranian research system are as follows:

*Research centers affiliated to the MSRT:* The majority of Iranian research institutes belong in this category. These types of institutes are mainly located in public universities and share academic staff and facilities with the university in which they are located. The top research institutes affiliated to the MSRT are: the *Institute for Research in Fundamental Sciences,* the *Iran Polymer & Petrochemical Institute,* the *Material and Energy Research Center,* and the *National Institute of Genetic Engineering and Biotechnology* (ISC, 2013).

*Research centers affiliated to the MOHME:* Various research institutes and centers are affiliated to the MOHME. Some research institutes are located in public medical universities and others are independent research institutes. The biggest research institute of this ministry is the *Pasteur Institute of Iran (IPI)* which was established in 1920 and currently has three centers located in three different Iranian cities. IPI centers are active in both basic and applied life sciences. In addition to research, the IPI offers educational master's and PhD degree programs (IPI, 2017).

*Research centers affiliated to the Ministry of Energy:* Energy research is one of the top priorities of the country's NIS. The *Niroo Research Institute of Iran* (NRI) is the main active player in this field. It was established in Tehran in 1997 to conduct basic and applied research in the field of electric power. The institute consists of eight research centers, 21 research departments, and more than 20 laboratories. The NRI is one of the few research institutes in the country that focuses on technology development through applied research (NRI, 2017).

*Research centers affiliated to the Ministry of Petroleum:* Petroleum, as one of Iran's main natural resources, plays a critical role in the country's economy. Therefore, the *Petroleum Ministry* has allocated significant resources to research institutes in this field. The *Research Institute of Petroleum Industry (RIPI)* is one of the biggest, and is the oldest, research institute affiliated with the ministry. Another important research institute is the *Institute for International Energy Studies (IIES)*, established in 1991 (IIES, 2017). In addition to the research institutes, universities affiliated to the *Ministry of Energy* are also active in the field of petroleum research.

*Research centers affiliated to the MIMT:* The *Institute for Trade Studies and Research (ITSR)* was established in 1980 as the main research institute of the MIMT. The institute currently has four research centers as well as a business training center (ITSR, 2017).

*Research centers affiliated to the Information and Communications Technology Ministry:* The main research institute of the *Ministry of Information and Communications Technology* is the *Iran Telecommunication Research Center (ITRC)*. The center was established in 1970 with help from Japan and currently consists of four departments. The ITRC conducts research in the following fields: Information Technology, Communication Technology, ICT Security, Strategic and Economical Studies (ITRC, 2017).

*The Academic Center for Education, Culture and Research (ACECR):* was established by the *Supreme Council for Cultural Revolution* in 1980. Since then it has expanded its role by establishing non-profit universities and developing research centers. The ACECR receives 20% of its budget from public funds and the remainder from the private sector

(research and education activities). ACECR is the biggest research center in Iran and consists of 129 research groups and 113 technical centers. It has 12 branches in Tehran and 30 branches in other cities around the country. All branches of this academic center work closely with local universities (and share academic staff). The most important research groups and centers of ACECR are the *Royan Institute* and *Avicenna Research Institute*.

The list of top research institutes of Iran is presented in the appendices (see Appendix 7.2).

## 4.3 Industry

Iranian industry is mostly state-owned, though in the past decade, the country has attempted to boost privatization. To support this, the *Iranian Privatization Organization (IPO)* was established in 2001 as a state-owned company affiliated to the *Ministry of Economic Affairs and Finance* (IPO, 2016). Since then, the government sold several of its enterprises and therefore the share of the government in the country's GDP was reduced from 80% to ca. 40% between 2005 to 2009 (Press TV, 2009). Although the government is still highly engaged in the main industries (e.g., oil and gas, automotive and mining ), Iranian SMEs have the highest share in terms of employment, as they are responsible for two-thirds of employment in the country (see Table 3).

**Table. 3 Distribution of Iranian Firms According to Size (MIMT, 2015)**

| Firms Size (Employees) | Number of Firms | Share in Employment (%) |
|---|---|---|
| Micro and Small (1-49) | 81,000 | 44 % |
| Medium (50-99) | 4,000 | 12 % |
| Large (more than 100) | 3,000 | 44 % |
| Total | 88,000 | 100 % |

As a resourced-based economy and a developing country, Iran does not have a very diverse export profile. In 2015, the majority of the country's exports were related to fuels (with 58%), followed by manufacturing goods (27%), food items, ores, and metals (each with 7%), and others (1%) (UNCTAD, 2016). In 2014, high-tech manufactures covered only 1 % of the country's non-fuel exports (UNCTAD, 2016). On the other hand, medium-tech manufactures and resource-based manufactures together formed more than half of the country's non-fuel export share.

Although high-tech firms have a very low share in the country's exports, their share in the economy is growing slightly. The export revenue of knowledge-based products (by the firms, S&T parks, and incubators) increased from USD $0.7 to USD $50.66 million between 2012 and 2015 (MSRT, 2016).

### 4.3.1 Industrial Sectors

The diversification policies have made Iran's economy one of the most diversified in the region. Various industries (petrochemicals, chemicals, automobile, cement, iron, steel, agriculture equipment, medical equipment, pharmaceuticals, textiles, food, etc.) are active in the country (MIMT, 2015). Nevertheless, there is a noticeable gap between the development of some sectors (such as petrochemicals and chemicals) when compared

with others (such as textiles). In the past two decades, the shares of different sectors in the country's economy have changed (see Figure 8). The chemicals sector has continued its role as the leading industry in the country, whereas the textile sector has almost vanished. The oil products sector and vehicles sector have developed significantly and their combined share in added value to the country is equal to the share of the chemicals sector.

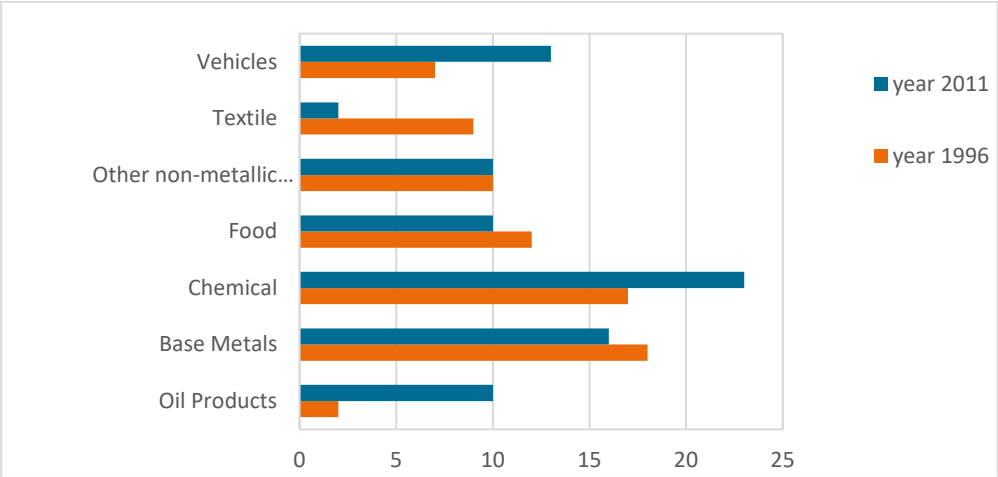



**Figure. 7 The Share of the Top Industrial Sectors in Iran Total Added Value (in Percent) in 1996 and 2011 (MIMT, 2015)**

Knowledge-based firms have a low share in the industrial sectors of the country. In total, 2732 firms have been registered by the VPST as knowledge-based. These firms are active in various fields. Of the knowledge-based firms, 20.1% are categorized as being in the ICT field, 15.5% in the electronics and communication field, 12.2% in laboratory and manufacturing equipment, 11% in biotechnology, 6.9% in advanced materials field, 6.8% in oil and gas, 6.8% in medical technology, and the rest in other fields (VPST, 2016).

### 4.3.2 Industrial R&D

Many Iranian industries have been highly affected by the nuclear sanctions against Iran. The sanctions prevented them from participating in technology transfer in various technology fields and therefore led to a lack of access to advanced technologies for many enterprises. This was a push factor for the industries to undertake indigenous innovation efforts.

#### 4.3.2.1 Input: R&D Expenditure

A report from 2010 shows that the government had the highest share in R&D expenditure with 41%, followed by higher education organizations (which are mainly governmental) with 37%, businesses with 20%, and the private and non-profit sector with 2% (Ghazinoori et. al., 2012).

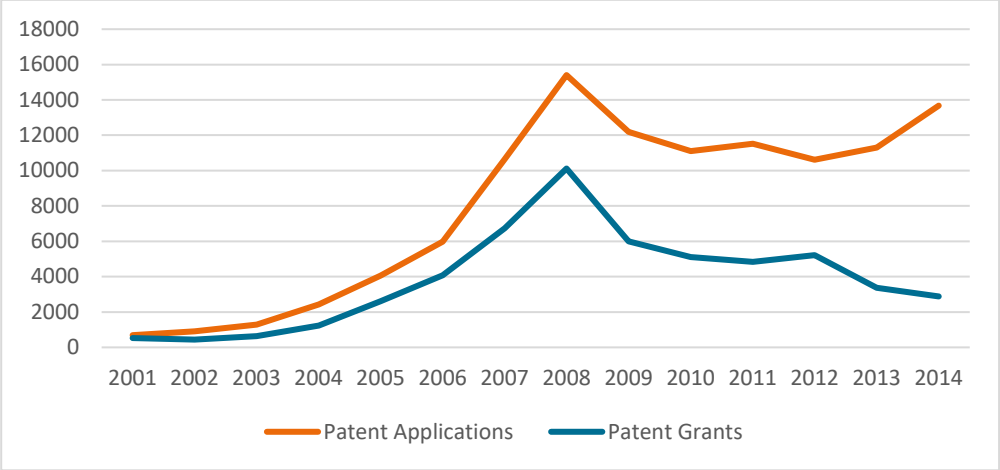
R&D intensity (the share of gross expenditure of the GDP on R&D) has fluctuated in recent years with a decreasing trend (down from 0.52% in 2011 to 0.47% in 2015) (IPRC, 2016). In 2016, the majority of R&D investments were related to buying machinery, tools, equipment, and software (63.8%) followed by the acquisition of technological knowledge from other firms and organizations (20.80%). Internal R&D (10.7%) and collaborative R&D (4.6%) have the lowest share (VPST, 2016). Investments and activities in technology transfer can support the country to improve the availability of the latest technology, for which there is a high demand (Schwab, 2016). Nevertheless,

the level of technology absorption capacity of the Iranian firms is low (Schwab, 2016) which can act as a barrier to the successful transfer of technology.

#### 4.3.2.2 Output: Patents

The *World Intellectual Property Organization* (WIPO) reported a dramatic increase in the number of patent applications in Iran between 2004 and 2014 (see Figure 9). From 2004 through 2008, the number of both patent applications and registrations grew sharply mainly due to a lack of sufficient regulation in examining the patent applications. After implementation of a new law, the patent examination process became stricter and resulted in a significant decrease in both patent applications and registrations.

**Figure. 8 Number of Patent Applications and Grants by Residence in Iran, 2001-2014 (WIPO, 2017)**




## 4.4 Transfer Organizations

Over the past decade, the role of intermediary organizations in the Iranian NIS has grown considerably. Up until 2001, the country had just one S&T park and one incubator. However, the number increased sharply in the following years. Currently, there are 41 S&T parks and 178 incubators registered at (and some affiliated to) the MSRT (see Figure 10) and one park affiliated to the VPST. There are 3,835 firms and 30,000 technical employees active in S&T parks and incubators registered with the MSRT (MSRT, 2017).

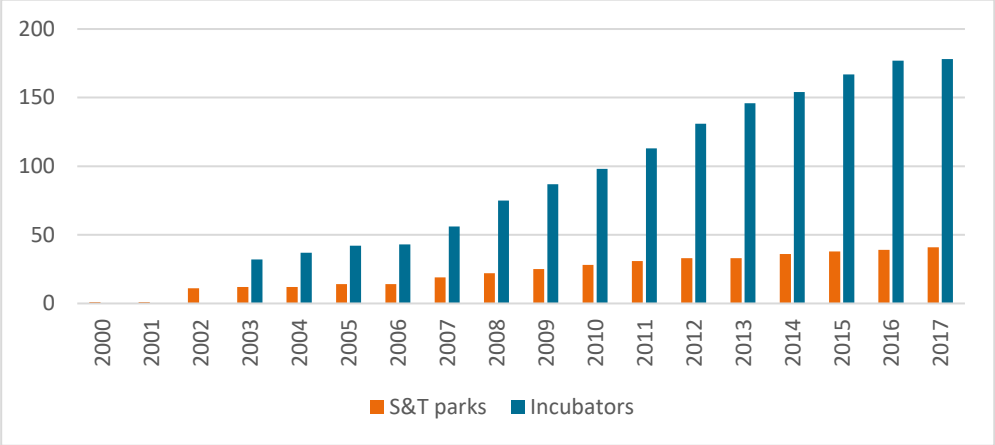



**Figure. 9 Number of S&T Parks and Incubators Affiliated to MSRT, 2000-2017 (MSRT, 2017)**

In a well-developed NIS, the various intermediary organizations exist and offer services (e.g., brokering, capacity building, access to financing, innovation management, etc.) to facilitate transfer of knowledge and technology between the actors of the system (Howells, 2006). Although the concept of intermediary organizations has been acknowledged by the MSRT and the VPST in the past decade, there remains only limited types of intermediary organizations offering limited services in the country's NIS.

### 4.4.1 Transfer Organization Types

The most common type of intermediary organizations in Iran are S&T parks and incubators, both of which focus on providing co-working spaces for Iranian high-tech or medium-tech start-ups and SMEs.

In the past decade, venture capital firms and accelerators have emerged to a small degree and have provided about USD $340 million in support to Iranian enterprises. They have broadened their services in recent years as there is now more trust towards Iranian innovation projects and new regulations allow them to offer tailor-made services. In 2015, the members of the *Iranian Venture Capital Association* (IVCA) financed 260 projects, provided 6,900 facilities, and offered 2,300 financial services such as bonds (UNCTAD, 2016).

Business and financial consulting firms are another type of intermediary organization which offer services in business development and accounting. In addition, some of these firms provide education services in knowledge and innovation management.

In their 2017 study on the role of transfer organizations, Houshmand et al. indicated that the majority of organizations promoting technology transfer and innovation cooperation are consultancy firms and innovation promotion organizations (e.g., university-industry offices, innovation cooperation centers, IP management offices, etc.) and that business associations and non-governmental organizations (NGO), one of the main players in knowledge and technology transfer, mainly offer match-making services. However, very few NGOs (e.g., IRAMOT and specialized research and development centers of industry, mining and trade associations) provide supporting services and innovation cooperation development activities between universities (or research centers) and industry.

### 4.4.2 The Main Transfer Organization Actors

Several S&T parks play a role in the Iranian NIS as intermediary organizations. According to the MSRT and the VSPT, the top S&T parks (in terms of size and product revenue by the firms) are:

*Isfahan Science and Technology Town (ISTT):* The town was established in 2000 at the *Technical University of Isfahan* and is affiliated with the MSRT. As the oldest and biggest S&T town, the ISTT hosts various S&T parks. According to the MSRT, the ISTT is the leading tech-park in terms of the value of export products by its registered firms. There are currently about 320 companies registered there. The ISST consists of two main parks (*Sheikh Bahai Park* and *Abu-Reyhan Park*) and several incubators (ISTT, 2017).

*Pardis Technology Park (PTP):* The park was founded in 2005 by the VPST. In 2013, R&D investment in the park was around USD $32 million. There are currently 148 small and medium-sized companies and incubators working in various fields (e.g., IT, ICT, nanotechnology, biotechnology, mechanics, etc.) at the park (PTP, 2017).

*University of Tehran Science and Technology Park (UTSTP):* was first started as an incubator in 2003 and was registered as S&T park in 2005. In total, there are about 123 firms with 1184 employees in the park (UTSPT, 2017).

The main public and private venture capital (Venture Capita)l providers in the country are: *Barekat Ventures, Iran Biotech Fund, Arman Investment Bank, Griffon Capital, high-tech development fund, IPF, INSF, Iratel Ventures, Isfahan Science and Technology Fund, Karafarini Omid Fund, Amidi Investment Group, Kardan Investment Bank, Karen Ventures, Parian Lotus Investment Bank, Partsaz Investment Group, Sarava Pars, Sharif VC, Shenasa VC, Simorgh Investment Group,* and *SWpars.*

The Iranian tech-parks are state-owned organizations, but the number of private incubators and accelerators in the country is growing. The majority of private accelerators offer services to IT start-up projects. The major IT start-up accelerators or acceleration programs are: *Avatech* (funded by *Sarava Pars*), *DMOND* (affiliated with the *Amidi Investment Group*), *TrigUp* (affiliated with *FANAP*), *Setak* (affiliated with *Sharif University of Technology*), and *know-tech* (funded by *Barekat Ventures*). International accelerators such as the Berlin-based *Rocket Internet* have also entered the Iranian market and financed IT start-ups. Nevertheless, only few private accelerators such as *Shezan* and *Fin-tech* (funded by *Barekat Ventures*) offer acceleration services to other high-tech firms. The majority of non-governmental funds have targeted companies in biotechnology (15%), advanced medicine and biomedical engineering (14%) and nanotechnology (13%) (IVCA, 2016).

Industry and business associations are other players that offer services to Iranian firms to help develop their capacities. The *Industrial Management Institute (IMI)* was established in 1962 as the main public intermediary organization responsible for developing management capacities in Iranian enterprises (IMI, 2017). The IMI has several branches (mainly managed by the private sector) in all provinces of the country. The *Iran Entrepreneurship Association,* the *Iran Chamber of Commerce,* and the local chambers of commerce are the other associations which support stakeholder dialogue and networking within the Iranian NIS.

Among the Iranian NGOs, the *Iranian Association for Management of Technology (IRAMOT)* is one of the main players actively offering services in technology and innovation management. The IRAMOT is supported by the VPST and the MIMT.

# 5
# Linkages within the National Innovation System

Innovation linkages in Iran are relatively weak. According to the GII report, Iran was ranked 77 (out of 128 countries) in terms of innovation linkages (Cornell University, 2017). Table 4 gives a detailed overview of the status of innovation linkages in Iran.

**Table. 4 Status of Innovation Linkages in Iran in 2016 (Cornell University, 2017)**

| Components of Innovation Linkage | Score (0-100) | Rank (out 128) |
|---|---|---|
| University/industry research collaboration | 33.6 | 97 |
| State of cluster development | 43.3 | 76 |
| Percentage of gross expenditure on R&D financed abroad | n/a | n/a |
| Joint ventures/strategic alliances: Number of deals, fractional counting (per billion PPP[1]$ GDP) | 0 | 94 |
| Number of patent families filed by residents in at least two offices (per billion PPP$ GDP) | 0 | 111 |

This chapter aims to discuss the innovation linkages with a focus on national and international linkages from both subjective and objective perspectives. In this regard, both field research data and secondary data were used.

## 5.1
## SWOT Analysis of the Iranian NIS

In order to analyze the Iranian NIS from different perspectives, a SWOT analysis was conducted with Iranian diaspora working as researchers and living in Germany. With this in mind, two workshops were designed with the Iranian researchers in Germany. These researchers shared their experiences relating to both Iranian and international research and suggested the strengths and weaknesses of the system as well as some of the opportunities and challenges for international cooperation. The sample group profile is as follows:

- Sample size: 51 (27 female, 24 male)
- Average age: 33.06
- Education level: Master's student (2), PhD candidate (33), Postdoc researcher (5), and university professor (1)
- Number of education institutes (in which the sample group is working): 21
- Types of institute (in which the sample group is working): universities and research institutes (Leibniz Center, Helmholtz Center, Max Planck Institute, and Fraunhofer-Gesellschaft)
- Locations of education institutes: 11 different cities

[1] Stands for Purchasing Power Parity

The workshops focused on a SWOT analysis of Iran's NIS. The result of the workshops are as follows:

### 5.1.1 Strengths

The majority of participants consider resources (mainly human, natural or financial resources earned from oil and mineral sales) as a main strength in the system. They believe that the large number of young, well-educated academic workers constitute great human capital for Iran.

Culture and national identity is another strength mentioned by the majority of participants. The statements in this regard relate more to the history of the country, from which a strong national identity is derived.

Openness of Iran's economy and informality has been also mentioned as a strength. The participants believe that an increase in the number of new industries in Iran which resulted from the openness of country's economy can be considered a strength. In addition, informality in doing research and business can sometimes support the system to develop faster (though the participants believe that it can also be a weakness in some cases).

### 5.1.2 Weaknesses

Iran's human capital was not only perceived as a key asset for the country, but also as a weakness by some workshop participants. While the predominant strength of the Iranians was seen as scientific excellence, the weaknesses were mentioned as mainly relating to a lack of managerial skills, problem solving skills and most importantly, a lack of teamwork (due to low trust and high levels of individualism). Therefore, lack of soft skills was seen as an internal challenge to the Iranian research and innovation system. In addition, inadequate infrastructure in the R&D sector (due to an incorrect allocation of financial means and a lack of long-term planning) was also considered a weakness of the system.

Cooperation between the key players in the Iranian research and innovation system was also described as problematic. Isolation of certain cities due to geographical distance, as well as the lack of network management, were mentioned as the main causes for lack of cooperation between local actors. Moreover, the participants believed there to be a very weak cooperation between universities and the private sector and that hardly any research is funded by industry (especially by the private sector).

There is a huge gap between research and education in the field of humanities when compared with the natural sciences and engineering. This was identified by some participants as a cause of both the soft skills problem and the lack of inter-institutional cooperation. The participants also criticized the lack of strategy, vision, and mission which can highly impact the development of research institutes.

Another weakness was described as the role of the state in the Iranian innovation system, as this leads to a lack of participation by the private sector in the country's economic development. The main factors believed to influence private sector participation were the inadequate policy design and implementation of different topics (e.g., intellectual property, patent system), the lack of coordination policies, and corruption.

### 5.1.3 Opportunity

Almost all participants stated that the *Joint Comprehensive Plan of Action* (JCPA) for limiting and controlling the Iranian nuclear program could provide the country with new opportunities to develop its capacity and gain new resources.

The large number of well-educated Iranian scientists abroad was considered a great potential for the development of Iran. Although the low return rate is still a problem (brain drain), it was believed that the Iranian diaspora can be considered as a great human potential for the economic development of the country (brain gain). Future Foreign Direct Investment (FDI) can provide job creation for highly skilled labor and it can attract diaspora.

Another outcome of the JCPA could be opening up new markets for Iranian industries. It could thus enhance exports and result in job creation and new product developments via R&D. In general, there was hope that Iran's image abroad would improve in the near future and that this would ease the development of international cooperation and networking in both industry and academia.

### 5.1.4 Threats

One of the key concerns raised by the majority of participants was regarding cultural influence by Westerners due to increasing cooperation with the West. They believe this influence to be critical as it might change the originality and significance of the Iranian-Islamic identity.

Opening the doors to the development of more international cooperation might also prove critical for other reasons. The participants believe that the high levels of infrastructure and financial resources of many western research institutions create a pull effect and might motivate many highly qualified Iranians to leave the country (brain drain). Some participants expressed their concern that easing the entry requirements for western countries could lead to the further loss of highly skilled workers.

Some participants expressed concern that international political opposition to Iran's economic integration is an obstacle for the Iranian NIS's ability to benefit from JPCA, and that it could keep the Iranian NIS in isolation for longer time.

Another perceived threat for the Iranian economy after integration is the high level of competition within international markets. For instance, one danger could be a "flooding" of the Iranian market with Chinese products. Lack of connection between the Iranian and international financial systems due to trust issues and the gap between the applicable standards was further considered problematic.

Problems between Iran and certain countries in the region were also believed to negatively affect the country's image and hence, the NIS's international cooperation development.

According to some participants, misperceptions (based on a lack of knowledge regarding the region's cultural and geopolitical situation and history) about Iran by some Europeans might also tarnish its image and reduce the motivation of western actors to cooperate with Iranian NIS actors.

## 5.2 National Linkages

The survey results indicate that the need exists to develop linkages within the Iranian NIS. One of the main linkages that needs to be developed is between universities and businesses. The existence or lack of such linkages can affect knowledge diffusion significantly. According to the GII report, Iran was ranked 36 (out of 128 countries) in terms of knowledge creation and 24 (out of 128 countries) in terms of knowledge impact. However, the knowledge diffusion in the country is relatively weak (ranked 121 out of 128). It is expected that strong university-business ties could reduce this knowledge transfer gap.

Iran's research and education system has been developed considerably. However, intra-firm R&D collaboration does not occur frequently. According to the Iran National Innovation Survey results of 2016, collaborative R&D had the lowest share in terms of number of activities and amount of investment compared to other types of activities (VPST, 2016).

In our survey, the Iranian researchers expressed that, despite the strength of universities in terms of human resources, the lack of university and industry collaboration is due to:

- lack of trust,
- weakness of the regulatory framework (e.g., high level of bureaucracy and weak intellectual property regulations),
- lack of development in social sciences (that can result in lack of management skills),
- lack of governmental support (e.g., lack of financial supports, inappropriate allocation of financial resources).

Ghazinoory (2006) argues that two reasons behind such low cooperation levels are a lack of awareness on the side of the universities about industry demands, and a lack of trust from industry in the capabilities of universities relating to research commercialization.

Weakness in the regulatory environment could also lead to a lack of trust, and thus be another reason for lack of cooperation (Cornell University, 2017). The government has improved intellectual property (IP) rights in recent years, which is expected to affect this collaboration in the long term.

A further reason is the lack of intermediary services for building capacities for such cooperation. S&T parks and research institutes offer co-working spaces and facilities (laboratories, etc.) to researchers. But there is a lack of intermediaries which support Iranian researchers in developing the skills (e.g., project management and innovation management skills, etc.) essential for applied research activities.

Governmental support mainly targets just a few universities and industry sectors. This could be due to a lack of financial resources on the side of the government. Nevertheless, there is a need for nationwide promotion programs which cover various research organizations, universities, and industry sectors. Such promotion programs can act as pull factors for strengthening university-business linkages.

## 5.3 International Linkages

International linkages could provide resources for NIS actors and support them in developing their capacity. The Iranian NIS has developed over the past decade, but it lacks resources (e.g., FDI, infrastructure, etc.) and it needs to further develop its capacity. After the Iran nuclear deal, the country gained a unique opportunity to integrate itself more into international activities. According to the results of the research interviews, the opportunities for international cooperation from the Iranian researchers' perspective are:

- cooperation with Iranian diaspora (brain gain),
- integration into international research projects and participation in international conferences,
- increase in FDI.

Over the past decades Iran has faced substantial brain drain. More than one million educated human resources have left the country, with an average of 200,000 emigrations per year (Chaichian, 2011). Such a high level of emigration landed the country among the top 10 south-north emigration sources between 2000 and 2010 (Miguelez, 2013). The Iranian diaspora are among the top high-skill emigrants. In 2012, Iranian inventors abroad were cited about twice as often as the Iranians living in Iran (WIPO, 2013). Hence, cooperation with Iranian diaspora could be highly profitable for the country's NIS. The interviewed diaspora suggested that cultural similarity and attachment to the homeland can act as pull factors in the development of such cooperation. The *National Elite Foundation* of Iran is the main organization promoting cooperation between Iranian organizations and diaspora. Our interviews suggest that the foundation should adjust its programs to fulfil the demands of diaspora (e.g., diversifying integration and cooperation programs).

The share of international cooperation in scientific publications of Iran reduced sharply from 35.27% in 1996 to 16.75% in 2011. This was followed by a slight increase to 20.4% in 2016 (Scimago, 2017). Inbound mobility in tertiary education (and thus as an enabling factor for international cooperation) is very low in Iran when compared to other countries (Cornell University, 2017). The Iranian researchers believe that the recent opening of the country could ease the collaboration, as it enables Iranians to travel abroad more easily. Furthermore, the number of international conferences taking place in the country has increased. Nevertheless, more initiatives (especially funding programs) are needed to support international cooperation in academia.

The post-sanction era presents an opportunity for the Iranian NIS to obtain more financial resources. As was discussed before, the country lacks investment in many fields and has suffered from a shortage of FDI inflow. FDI is a vital factor to increase the R&D intensity, infrastructure and technology readiness in the Iranian NIS. The Iranian researchers believe that the Iranian diaspora could be suitable partners for the Iranian NIS. It was estimated that the Iranian diaspora had a combined net worth of USD $1.3 trillion in 2006 (Shoamanesh, 2009). A recent estimation by the Iranian government in 2015 suggests that Iranian diaspora wealth is four times higher than the country's GDP. Now it is the government's task to convince the Iranian diaspora to contribute to developing the country.

# 6 Conclusion

Iran as a developing country is increasing its efforts to become a knowledge economy. In order to facilitate this transition, the policy makers have developed various policies in order to promote knowledge creation. However, there is still a huge gap between knowledge production and knowledge commercialization. An overview of the Iran Horizon 1404 program indicates that the majority of the country's growth indicators are related to quantitative development and there is less focus on development of quality. In addition, due to the economic stagnation which occurred as a result of the nuclear sanctions against Iran, contributions to the education and research budget as well as to the R&D budget were decreased both by public and private actors. As a result, the chance of academia to cooperate with industry was reduced dramatically.

Although Iran's NIS is still in the development stage, it is vital for the policy makers to design a comprehensive framework which can encourage the development of innovation linkages (which are relatively low), promote innovation culture within firms, and develop more efficient innovation cooperation incentives that focus not only on quantity but also on quality. These policies should focus more on privately owned SMEs rather than large-sized public enterprises.

Although an increased number of local transfer organizations can support the development of linkages between the different Iranian NIS actors, there remains a need for the development of various market-oriented services in order to strengthen the linkages.

Finally, the post-sanction era has provided a unique opportunity for the Iranian NIS to develop more international cooperation, and the Iranian diaspora could the best accelerator for this process.

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# 8
# Appendices

## 8.1
## Abbreviations

| | |
|---|---|
| ACECR | Academic Center for Education, Culture and Research |
| FDI | Foreign Direct Investment |
| GDP | Gross Domestic Product |
| IDRO | Industrial Development and Renovation Organization |
| IIES | Institute for International Energy Studies |
| IMIDRO | Iranian Mines and Mining Industries Development and Renovation Organization |
| INSF | Iran National Science Foundation |
| IP | Intellectual Property |
| IPI | Pasteur Institute of Iran |
| IRIPO | Iran Intellectual Property Office |
| IRPHE | Institute of Research and Planning in Higher Education |
| IMI | Industrial Management Institute |
| IPF | Innovation and Prosperity Fund |
| IPO | Iranian Privatization Organization |
| IPRC | Islamic Parliament Research Center |
| IRAMOT | Iranian Association for Management of Technology |
| ISC | Islamic World Science Citation Center |
| ISTT | Isfahan Science and Technology Town |
| ITRC | Iran Telecommunication Research Center |
| ITSR | The Institute for Trade Studies and Research |
| IVCA | Iranian Venture Capital Association |
| JCPA | Joint Comprehensive Plan of Action |
| MIMT | Ministry of Industry, Mine and Trade |
| MOHME | Ministry of Health and Medical Education |
| MPO | Management and Planning Organization |
| MSRT | Ministry of Science, Research and Technology |
| NGO | Non-Governmental Organization |
| NIS | National Innovation System |
| NRI | Niroo Research Institute |
| PPP | Purchasing Power Parity |
| PTP | Pardis Technology Park |
| R&D | Research and Development |
| RIPI | Research Institute of Petroleum Industry |
| S&T | Science and Technology |
| SME | Small and Medium Sized Enterprise |
| TPO | Trade Promotion Organization of Iran |
| TVTO | Technical and Vocational Training Organization |
| VC | Venture Capital |
| VPST | Vice-Presidency for Science and Technology |
| UNCTAD | United Nations Conference on Trade and Development |
| UTSTP | University of Tehran Science and Technology Park |
| WIPO | World Intellectual Property Organization |

## 8.2 List of Important Research Institutes

| Category | Name of institute |
|---|---|
| Aerospace | ▪ Aerospace Research Institute |
| Bio-sciences and medicine | ▪ Agricultural Biotechnology Research Institute of Iran<br>▪ National Institute for Genetic Engineering and Biotechnology<br>▪ Iranian Clinical Research Organization, ArasClin<br>▪ Iranian Academy of Medical Sciences<br>▪ Avicenna Research Institute<br>▪ Institute for Cognitive Science Studies<br>▪ Rajaie Cardiovascular, Medical and Research Center<br>▪ Institute for Health Sciences Research<br>▪ Royan Institute<br>▪ Sport Sciences Research Institute of Iran<br>▪ Pasteur Institute of Iran |
| Economics, finance and investment | ▪ Agricultural Planning and Economic Research Institute<br>▪ Institute for Management and Planning Studies<br>▪ Iran Center for Management Studies |
| Education | ▪ Research Institute for Education<br>▪ Institute for Research and Planning in Higher Education |
| Energy and material sciences | • Institute for International Energy Studies<br>• Research Institute of Petroleum Industry<br>• Niroo Research Institute<br>• Iran Polymer and Petrochemical Institute |
| Engineering | ▪ Iran Telecommunication Research Center<br>▪ Center for Reliability Research (Affiliated to the ARI)<br>▪ Chemistry & Chemical Engineering Research Center of Iran<br>▪ Geological Survey of Iran<br>▪ Soil Conservation and Watershed Management Research Institute<br>▪ International Institute of Seismology and Earthquake Engineering<br>▪ Water Research Institute |
| Humanities | ▪ Academy of Persian Language and Literature<br>▪ Institute for Humanities and Cultural Studies<br>▪ Institute for Cultural Research and Studies<br>▪ International Center for Islamic Studies |
| Informatics | ▪ Iranian Research Institute for Information Science and Technology |

| | |
|---|---|
| | ▪ Iran Telecommunication Research Center |
| Multi-sectoral | ▪ Academic Center for Education, Culture and Research<br>▪ Statistical Research and Training Center<br>▪ Iranian Research Organization for Science and Technology<br>▪ Research Center of Environment and Sustainable Development |
| Natural sciences | ▪ Iranian National Institute for Oceanography and Atmospheric Science<br>▪ Agricultural Research and Education Organization<br>▪ Institute for Research in Fundamental Sciences |
| Political and social sciences | ▪ Center for Strategic Research<br>▪ Research Institute of Strategic Studies<br>▪ Institute for Political and International Studies<br>▪ Islamic Parliament Research Center |
| Road and housing | ▪ Road, Housing and Urban Development Research Center |

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Fraunhofer Center for International
Management and Knowledge Economy IMW
Neumarkt 9–19, 04109 Leipzig, Germany

www.imw.fraunhofer.de