Technology

Overview

Educated human resources, along with knowledge-based economy based on the general policies of Resistance Economy, have helped Iran to enjoy important contribution in this area in recent years. In the knowledge production in various fields, Iran has been able to earn significant global ratings.

Scientific infrastructures and the fact that knowledge-based and technological products (both in the goods and services sector) have a higher potential to enter more diverse markets than in other export markets has led the knowledge-based companies grow considerably in recent years, so the number of these companies grew steadily from 55 in the year ended March 2014 to more than 3,000 companies in the year ended March 2017.

At present, the current turnover of knowledge-based companies is more than 12.7 bn USD. The current share of knowledge-based companies is about 0.5% of GDP and based on the general policies of science and technology in the horizons of 2025, the GDP's share of technology and knowledge-based economies is set 50%.

However, as long as the results of applied research and innovative products are not introduced to the market, neither will the society benefit of it, nor researchers, innovators and technicians can, as it deserves, achieve their goals and finally they would not affect the economy.

Scientific indies	Yr. ended Mar 2014	Yr. ended Mar 2015	Yr. ended Mar 2016	Yr. ended Mar 2017 1.73%	
Iran's share in scientific articles in the world at ISI	1.34%	1.39%	1.49%		
Iran's share in scientific articles in the world at Scopus website	1.48%	1.51%	1.54%	1.78%	
Iranian Universities among Top Universities in the Times Ranking System	1	1	2	8	
Top scientists at the level of 1% of the world's scientists		173	199	208	
Science and technology development centers	146	154	167	178	
Science and technology parks	33	36	38	41	
Universities with HSE system	12	22	53	60	
Knowledge based companies in science and technology parks and business incu- bators	11	643	845	1,126	
Fechnologists in science and technology parks and business incubators	3,000	3,400	3,650	4,475	
Entrepreneurship and innovation centers in all government educational, research and technological centers	55	110	112		
Science and technology corridors		5	5	5	
lobs directly created in the science and technology parks and business incubators	22,035	25,000	29,606	30,000	
Knowledge-based export by science and technology parks and business incubators	1	806	856	231	
important technologies created in science and technology parks and business incubators	727	1,088	1,679	2,871	
important technologies exported by parks and business incubators (per year)	80	141	170	225	
Brands registered by parks and business incubators (per year)	62	78	104	136	
ldea to realization in parks and business incubators (per year)	1,131	1,360	1,556	2,460	

Table 14-1 Iran scientific & technological status

Based on the annual report of the Global Innovation Index, Iran's rank in terms of various indicators such as science, technology and innovation has improved over the years 2014-2017, reaching the 75th place in 2017. The main reason for this betterment is the improvement of the institutional framework and the increase in output (both knowledge-based and creative performance output).

Table 14-2 Iran's status in the world innovation index

Commercialized ideas to realization	773	975	1,040	1,228
Technologist centers applying for technology parks and business incubators	2,763	3,404	4,503	5,375
Companies turnover in technology parks and business incubators (mn IRR)	4,570,408	18,412,264	19,579,527	71,038,823
Domestic and foreign patents registered at WIPO	11,643	13,802	14,279	
World's science growth ranking of documents production at ISI	25	12	3	1
Source: MSRT.IR				

Development trends

- Increasing the number of science and technology parks
- Iran improvement in global position according to science, technology and innovation indices
- Increasing the number of knowledge-based companies to 3,000 in the year ended March 2017
- Ranking 15th in the world and the 1st in the Middle East in terms of scientific production in aerospace engineering

Knowledge-based sector

By the year ended March 2017, the number of knowledge-based companies grew by more than 29% compared to the year ended March 2016, by 3,000. The largest number of knowledge-based companies relate to ICT and application software, with more than 18% of all knowledge-based companies.



Figure 14-1 Knowledge-based companies

Source: ISTI

Technology Category	Number of Knowl- edge-based companies	Percentage (from total knowl- edge-based companies)	
Biotechnology	250	8.76	
Nanotechnology	81	2.62	
Optic and photonic (material, parts and systems)	60	1.9	
Advanced material (polymers, ceramics, metals, composites)	188	6.17	
Computer hardware, power engineering, electronic, control and communication	392	13.34	
Information and communication technology and computer software	580	18.89	
Advanced equipment for laboratory and production purposes	311	10.27	
Advanced medications	170	5.76	
Medical equipment, devices and accessories	135	4.62	
Aerospace	163	5.41	
Renewable energy	66	2.28	
Petrochemical, refinery, gas and oil advanced material and equipment	183	5.96	
Other fields advanced products	396	13.44	
Commercialization services	25	0.59	
Total	3,000	100	
Source: ISTI			

Table 14-3 Knowledge- based companies by fields

Most of the knowledge-based companies have been startups until the year ended March 2017 based on the type of approval with more than 58% of all knowledgebased companies active in Iran.





Source: ISTI

In the year ended March 2017, Knowledge-based companies managed to sell and gain income more than 5,572 mn USD. During the years 2014-2017, the income of knowledge-based companies has risen from 94 mn USD to more than 5,572 mn USD, which shows a significant growth. By the year ended March 2017, knowledge-based companies have been able to create more than 86,200 jobs, up from 43% copmpared to the prevoius year.

	Yr. ended Mar 2014	Yr. ended Mar 2015	Yr. ended Mar 2016	Yr. ended Mar 2017
Income (mn USD)	94.1	1,131.7	4,327.2	5,575.2
Employment (person)	2,145	29,503	60,061	86,255
CBI official exchange rate (IRR)	21,253	26,509	29,580	31,389
Source: ISTI.IR				

Table 14-4 Knowledge-based companies employment & income

Export

Of total 174 export knowledge-based companies, 102 companies (58%) are productive, 57 companies (32%) industrial and 15 companies (10%) are startups. Approximately 174 knowledge-based export companies are active in chemical products, textiles, pharmaceuticals, aerospace, machinery, industrial equipment, medical equipment, telecommunications and electronics and have included export products in the non-oil export.

Table 14-5 Knowledge-based companies export						
	Yr. ended Mar 2013	Yr. ended Mar 2014	Yr. ended Mar 2015	Yr. ended Mar 2016	APR-OCT 2017	
Export value (mn USD)	264.16	256.83	309.88	330.44	241.68	
Export growth (%)	-5.3	-2.8	20.7	6.6	-	
Source: ISTI.IR						

Table 4.4 B Manufacture Installer and second stress for some set

Knowledge-based companies export targets from April to October 2017 include Iraq with an export value of about 26 mn USD in advanced materials and chemicals and petrochemicals, Tajikistan with 23 mn USD, in chemical and etrochemical industries, Russia with 10 mn USD in advanced pharmaceuticals, chemicals and petrochemicals and Tanzania with an export value of 4 mn USD in laboratory and advanced materials and chemicals.

Based on 265 high-tech export tariffs, according to SITC Rev.4 list defined by the OECD, 826 companies, including knowledge-based companies, non-knowledge-based and state-owned companies, have export with high technology products. Out of the 826 companies exporting high tech goods, 713 companies (86%) are non-knowledge-based private and state-owned, 73 natural and legal traders (9%) and 40 companies (5%) are knowledge-based.

	Yr. ended	Yr. ended	Yr. ended	APR-OCT
	Mar 2014	Mar 2015	Mar 2016	2017
Export value (mn USD)	269.89	298.56	247.13	127.30
Export growth (%)	-26.55	10.62	-17.23	-
Source: ISTI.IR				

Table 14-6 High tech products Export

Among the high-tech products exported in recent years, polyethylene terephthalate, gas turbine components and components, molybdenum oxides and hydroxides, electrical boards and panels, medical equipment, optical equipment and advanced medicine had the most export share with high technology. Due to the drop in polyethylene terephthalate export, the drop in Hi-tech export has been decreasing in recent years.

Of knowledge based export targets with high-tech goods during the years 2012-2016, Iraq with value of 14 mn USD, Germany 10 mn USD, the UAE 9 mn USD, Turkey 7 mn USD and Belarus had an export value of about 5.5 mn USD.

Nanotechnology

Nanotechnology has been considered as one of the new and priority technologies in the upstream documents including vision 2025, general policies and the comprehensive scientific map. The first sparks on nanotechnology began in 2000. Nano, as a new technology, grew in Iran, initially known only to less than 10 university professors, but after 16 years, Iran ranked 16th in the world in terms of producing nanoscience and above countries such as Japan and France and gaining the 1st place in the region and Islamic countries. Nanoscale certificates are awarded to nanoscience products. Cumulative products with a nanoscale certificate by the year ended March 2017 included 172 goods, 153 tools and a total of 325 products.



Figure 14-3 Cumulative statistics of products with a Nano scale license

Source: Nanoproduct.ir

The industrial area of products with a nano scale certificate (goods and equipments) by the year ended March 2017 by industrial sector run as follows.



Figure 14-4 Industrial area of products having nanoscale certificate by the end of March 2017

Source: Nanoproduct.ir

8.306 nanotechnology articles were indexed by Iranian researchers at WOS, equivalent to 5.5% of all published Nano articles in 2016. With its share of nanotechnology, Iran, ranked 6th in the world with a growth rate compared to 2015. This position was obtained while in 2001, when few Iranian researchers and scientists were familiar with this emerging technology, gained 57th in the world and 6th rank in the Middle East by publishing 10 articles. In the next years, Iran consistently grew up in Nanoscience from10 Nano articles annually to 22 Nano articles a day. The average annual growth rate of Nano articles in these 16 years was about 60%. These articles include more than onefifth of the total scientific articles of Iran in WOS, while the share of Nano articles

from all papers in the world in 2016 is 9%. Iran's rank in Nano paper per capita is 23rd.

Rank	Country	Nano-articles	Share (%)	Rank	Country	Nano-articles	Share (%)
1	China	47,455	34.51	11	Russia	4,124	3
2	USA	22,337	16.25	12	Italy	3,901	2.84
3	India	11,066	8.05	13	Australia	3,406	2.48
4	South Korea	8,386	6.1	14	Canada	3,018	2.19
5	Germany	7,963	5.79	15	Taiwan	2,831	2.06
6	Iran	7,583	5.52	16	Saudi Arabia	2,489	1.81
7	Japan	6,952	5.06	17	Brazil	2,471	1.8
8	France	5,313	3.86	18	Poland	2,300	1.67
9	UK	5,038	3.66	19	Singapore	2,170	1.58
10	Spain	4,178	3.04	20	Turkey	2,056	1.5

Table 14-7 Top 20 countries in publication of nanotechnology articles in 2016

Source: Statnano

Stem cells

Iran's health system has made significant progress over the past few years in the field of stem cell and reached the world's 15th rank and the 1st rank in Islamic countries. Cellular knowledge in the world and Iran dates back more than 40 and 25 years, respectively.

There are not many countries able to achieve this important knowledge. With the achievement of this field, Iran has been able to obtain cellular treatment in the region of about 13 countries, including Iraq, Azerbaijan, Armenia and the southern countries of the Persian Gulf and been able to do its best. In the field of infertility and stem cell therapy, Iran has been very successful. According to latest statistics,

February 14, 2017, there are 76 clinical treatments for cell therapy and Iran is ranked 2nd in the Middle East and North Africa region.

Biotech

After the Islamic revolution and especially in the last 15 years, biotechnology has created good regional and international positions in products commercialization. The development of biotechnology is one of the general policies in the 20 years' vision. It is anticipated that Iran will be 3rd in the next three years with 49 items from the total of 146 medicines in Asia. One of the main goals of the National Biotechnology Document is to achieve 3% of the global biotechnology market by 2025, of which 0.5% has been achieved up to now. In 2016, Iran's biotechnology in Asia after China, Japan and India ranked 4th and won the 1st place in the region. Iran's rank in the world is 14. At present, the number of biotech medicines in the world market is 146, of which 20 are available in the Iranian market, with 4 monoclonal antibodies and 16 recombinant drugs. Iran is in 4th place in biotechnology production

Aerospace

In recent years, Iran has made significant progress in the field of aerospace science production, as ranked 1st in the Middle East. By producing 391 articles, Iran ranked 15th above Brazil, Swede, Netherlands and all countries in the Middle East in 2016. Iran held 14th place by providing 368 articles in aerospace in 2015 to stand among top 10 in its 10- year aerospace vision between 2017 to 2025. More than 163 knowledge-based companies in aerospace have been established and started to operate, by the year ended March 2017.

Rank	Country	Documents	Citable documents	Citations	Self- citations	Citations per document	H index
1	China	7,764	7,692	3,675	2,927	0.47	102
2	United States	6,139	6,039	3,081	2,009	0.5	216
3	Germany	1,438	1,414	697	382	0.48	94
4	United Kingdom	1,327	1,291	924	361	0.7	109
5	India	1,116	1,110	457	200	0.41	59
6	France	1,037	1,014	546	226	0.53	98
7	Italy	981	971	514	259	0.52	85
8	Canada	700	679	592	174	0.85	93
9	Japan	620	610	220	109	0.35	71
10	South Korea	596	588	247	85	0.41	75
11	Netherlands	548	539	231	79	0.42	68
12	Russian Feder- ation	519	514	178	102	0.34	52
13	Spain	484	473	255	100	0.53	62
14	Australia	419	409	377	132	0.9	85
15	Iran	391	380	557	316	1.42	49

Table 14-8 Top 15 in aerospace engineering article in 2016

Source: Scimago JRNL

Startups

Transportation startups

After the successful emerging of systems like UBER to the world, Iranian Snapp and Tap30, were developed. with Internet and smart phones, many people applied for these in order inside apps to commute the city. Snapp is the first on-line travel service in Iran, which began in 2014. This application is currently used in Tehran, Karaj, Isfahan, Shiraz, Mashhad, Qom, Tabriz and Ahvaz. To request a taxi through this app, travelers are requested to specify the route, travel options, service type and after viewing the travel cost, this app will automatically connect passengers with the nearest driver and sends the passenger's position to the drive. Passengers can also locate their driver's position.

In Snapp, you can pay both cash and non-cash. Now, in addition to Snapp and Tap30, a new App called Carpino, supported by the taxi fleet, started since March 2017.

Apps	Starting up	passenger version	Driver version					
Snapp	2014	3,275,000	219,000					
Tap 30	2016	1,190,000	50,000					
Carpino	2017	118,000	15,000					
Source: IBT								

Table 14-9 Transportation apps (android version)

Due to the high demand for vehicles which sometimes exceeds 18 mn trips in Tehran per day. Nearly 20 taxi applications are currently providing services to passengers.

Financial startups (FinTech)

FinTech or the use of new technologies in financially-based startups, is one of the sub-sectors mostly benefited from Internet infrastructure improvement, as new services in this filed have been provided typically to mobile platform and is in need of a permanent, public and low-cost access. The main bottleneck in FinTech development includes cheap, permanent and public access. It is not many years since the startup has grown but this time is enough for entrepreneurs to adapt to technological developments. However, to continue the startup, the experts suggest that government support is required, in order to introduce this ability to the market and fund rising after the birth of a startup. The FinTech development is not easy like starting-up in urban transportation and suffers major bottlenecks.

FinTech is a novel industry in Iran and has been emerging into the banking sector for several years. Also, endeavors to invest in the FinTech have already begun by some companies a few years ago. However, due to the lack of investment level or the efforts the reflection there is not any accurate data. According to the reports, the highest percentage of startup launch in Iran was in e-commerce and the lowest was in crowd funding as well as cloud computing. Additionally, the financial and banking sector were 2.6% and the mobile-based services sector was 8%.

Iran favors one of the highest rates of banking service penetration. The high rate of money transfers in the banking system and the high number of bank branches and transactions relative to the population reflect the high capacity of the banking system. Differences in revenues methods, wages and banks services have created opportunities and challenges that differ from other countries in the FinTech field for Iran. According to the Global Innovation Index in 2016, Iran ranked 2nd in" science and engineering graduates". This ranking represents the availability of required talented society in the financial technologies.

In terms of domestic market size, Iran is ranked 18th. Although start-up accelerators and venture capital funds have been active in fostering new ideas in the FinTech arena, but due to lack of access to accurate statistics, it is not possible to comment out the investments amount made in the FinTech field. Iran holds the 82nd ranking in terms of access to capital based on Global Innovation Index (GII) in 2016. Rules and regulations, along with other aspects have not been developed in a balanced manner.



In terms of institutional structure rules and regulations, according to the Global Innovation Index in 2016, Iran ranked 112, which indicates this factor weakness compared to other components of the FinTech ecosystem. Also, the lack of legal, technical and banking infrastructure to expand the operator's security and the low toward potential among economic activists are among the other challenges against by FinTech.

Food Start-ups

The food is the only industry in Iran with low risk. Over the past two years and especially with the mobile Internet development, various startups have emerged into this industry, each of which has provided creativity or new value. Since traffic issue makes visiting restaurant time-consuming and expensive, food startups have mostly been developed in the area of online food ordering, especially in big cities.

Some of these startups are categorized based on restaurant rankings, food supply centers, sharing customer experience and providing appropriate discounts.The most important of which such as SnappFood, Rayhoon, MamanPaz, EasyPaz, Chilivery, Delion and Fidilio.

Incentives & advantages for Investment

- Knowledge-based companies are subject to tax exemptions in respect of their goods and services income.
- Knowledge-based companies can favor customs duties exemptions for importing knowledge-based tech: knowledge-based goods production line, laboratory equipment, quality control (QC), goods for prototype knowledge-based products, goods for reverse engineering
- Knowledge-based companies can use temporary admission for raw materials and consumables in production, completion, preparation and packaging.
- Prohibition of the of foreign knowledge-based products which are domestically produced are not allowed to be bought items according to the Board of Ministers
- Knowledge-based companies are granted by over 200% extra broadcasting for promoting goods and services in the media (Radio, TV, provincial TV channels, etc.).
- The deputy for Science and Technology will pay 50% of the initial cost of approving knowledge-based companies entering Far bourse SMEs. Major knowledge-based companies with significant customs interactions are introduced as authorized economic enterprises in order to use the relevant benefits customs after the formal inquiries.
- Knowledge-based companies are entitled to cash payment percentage reduction of the transfer contract for operation right on industrial and technological settlements

lands (no change in the total amount). Fundraising for knowledge-based projects: introducing appropriate investment plans and schemes to private sector investors network.

- General marketing of knowledge-based products: Introducing Business to consumer (B2C) products and customer services in partnership with reputable online stores such as Digikala and Bamilo etc. with special conditions.
- Professional marketing of knowledge-based products: professional marketing for selected portfolio of knowledge-based products based on application area or geography.
- Developing knowledge-based products through export intermediaries: In order to facilitate the products entry into target markets and through Presidential Deputy for Science and Technology, knowledge-based companies can engage with export management and foreign brokerage companies.

Sanctions & Post-sanctions

Sanctions made Iranian experts pace good steps in the field of industry and in some way led to self-sufficiency and forced domestic manufacturers to rely on themselves in hard times. So that with the intensification of sanctions and the subsequent announcement of resistance economy by the Supreme Leader, special attention was given to knowledge-based production, so that, in accordance with the policies of the resistance economy, transition from an economy dependent on primary sources and raw materials was possible only on modern economy and knowledge based production.

Therefore, it was required to pay more attention to knowledge-based companies and to help them develop and promote, with the aim of eliminating the sales of natural resources and moving towards a knowledge-based economy and despite the fact that during sanctions there were many threats in various dimensions, the Iranian youth turned it into an opportunity and lit the dark sides of the various industries. The knowledge-based and research-based companies played a pivotal role in economic problems, which were affected by sanctions and undertook a lot burdens. Many of the knowledge-based products were achieved from the sanctions and restrictions.

Following JCPOA, the Presidential deputy for Science and Technology, in order to study the problems of technology provisions and domestic companies' cooperation active in new technologies with their respective counterparts abroad, launched to operate the potential of Iran's international interactions with other countries in bilateral and multilateral ways. In other words, the deputy will put the creation of advantages, bilateral agreements, and the exploitation of the capacity of existing interactions on the agenda through interinstitutional coordination and the promotion of domestic capacities using the capabilities of other countries.

The work group on International Affairs and Technology Diplomacy in September of 2017 has put forward a variety of issues that focus on monitoring the activities and programs of other countries in renewable energy, identifying organizations, institutions, institutes and international centers active in renewable energies, reviewing the road map for leading countries in the development of renewable technologies, developing communications and interactions with the International Renewable Energy Agency (IRENA), establishing effective links with countries such as China, Germany, Greece, Belgium, Oman, Austria , the Netherlands, Hungary and addressing inter-institutional energy documents such as renewable energy and climate change and air pollution Of the recent actions of the Deputy in the international arena was cooperation with the Austrian state. In these bilateral interactions, the contract for the transfer of solid oxide fuel cell (SOFC) technology, the agreement to create a joint design office for waste energy conversion systems, an agreement on the field of electric vehicles and its infrastructure, along with a joint agreement on solar energy systems were signed by the two sides. The important point in all cases is the collaboration of a knowledge-based company as a core member for pursuing and working in the fields, which reflects the firm commitment of the headquarters to Iranian knowledge-based companies in international cooperation.

Recently, a memorandum of understanding between Iranian and Armenian companies was signed. Based on the memoranda, the two Iranian knowledge-based companies will succeed in transferring technology to Armenian companies. The goal of signing the memorandum between Iranian and Armenian knowledge-based companies was to identify the common capabilities of the two countries in nanotechnology.

SWOT

Strengths

- Talented human capital, active experts and scholars
- Numerous technological products of knowledge-based companies to export overseas
- Active and effective entities for the development of science and technology policies

Weaknesses

Some industries unfamiliarity with today's world-class technologies (which reject knowledge-based ideas)

- Lack of national standards (which would lead to the reject of product with the new technology)
- The funding shortage in knowledge-based start-up firms (which causes the bankruptcy of knowledge-based companies)
- The lack of venture capitals (which wastes new ideas and innovations of knowledge-based companies)
- Problems of knowledge-based goods and services export

Opportunities

- The impact of nanotechnology on improving some relative advantages, such as materials, petrochemicals
- The possibility of participating in new international business networks
- The emerging of knowledge-based science and technology

Threats

- Uncontrolled import of foreign knowledge-based products
- Commercialization of domestic research findings abroad
- Increasing the intensity of professionals' one-way immigration (Brain Drain)