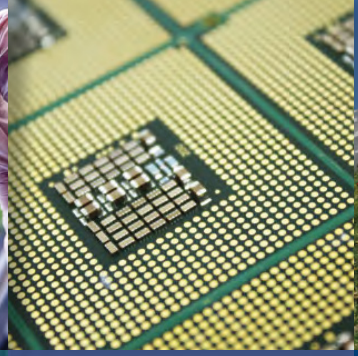

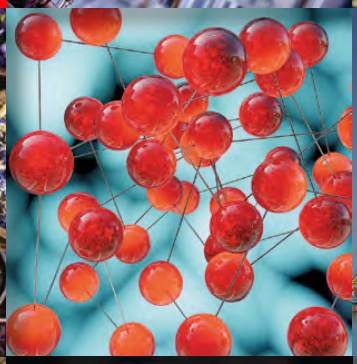

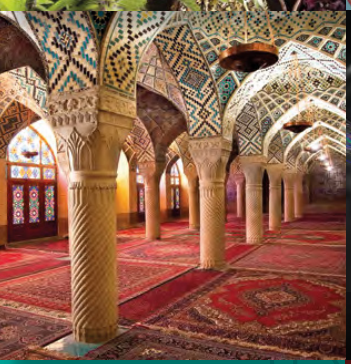

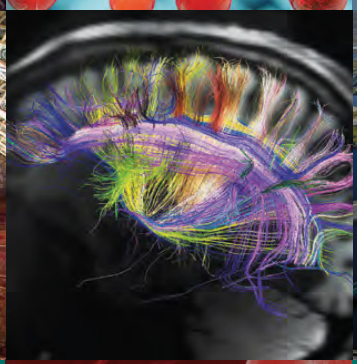

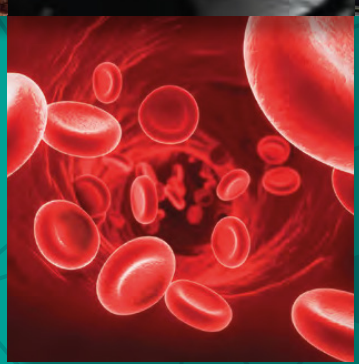

Science, Technology and Innovation in Iran: A Brief Review

IRAN 2023

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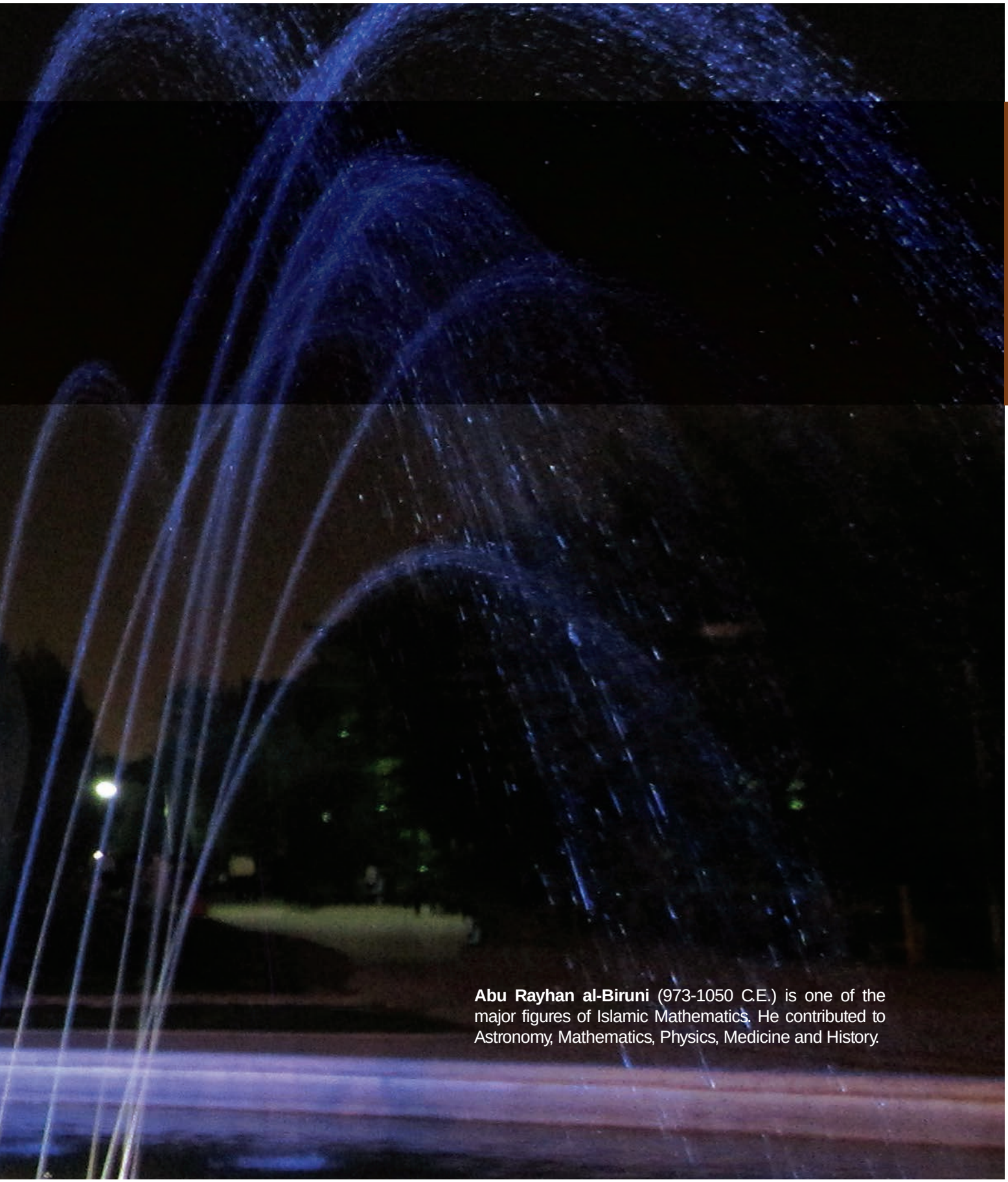


Abu Rayhan al-Biruni (973-1050 C.E.) is one of the major figures of Islamic Mathematics. He contributed to Astronomy, Mathematics, Physics, Medicine and History.

Iran, Cradle of Civilization

The Islamic Republic of Iran enjoys a rich and lavish history and boasts one of the world's oldest civilizations. Iran is located in southwest Asia, in the Middle East and is the 18th largest country by area in the world, spanning from as far north as Armenia or Turkmenistan to as far south as the Persian Gulf. The country's size and position have historically made it a strategic bridge for east-west and north-south trade routes which indicates its potential to be a regional hub for commerce and an attractive tourist destination.

Iran is one of the rare countries in the world which enjoys four distinctive seasons. In the north, the evergreen forests draw a parallel line to the beautiful serene waters of the Caspian Sea which makes the country's climate most pleasant. In the south, Iran borders the Persian Gulf with gorgeous and appealing palm trees and a hot and humid climate. To the east of Iran, one can find hot desserts with running sand and starry nights. On the west, this vast land is endowed with mountains high in the sky catching the eye of every visitor.

Iran has an abundance of various tourist attractions, from the ski slopes within a short car ride of Tehran to the 2,500-year-old ruins of the Achaemenid Empire at Persepolis and the harmonious gardens of the Bagh-e-Eram Palace in Shiraz, just to name a few. Iran is home to 26 UNESCO World Heritage sites (24 cultural and 2 natural sites) -more than Greece- plus a rugged coastline on the Caspian Sea that makes it one of the best countries for hiking, 20 mountain resorts for winter sports, beaches on the Persian Gulf, and the holy shrine (Imam Reza) in Mashhad.

Iran's economy in 2021, with GDP of nearly $359.71 billion, was the fifth largest economy in the Middle East region. It also has the second largest population of the region with an estimated 87.92 million people in 2021. Persian is the official language and Islam is the official religion of the country.

The country has a wealth of natural resources, including the first and fourth natural gas reserves and oil reserves, respectively, with the least economic dependence on oil incomes among oil-rich countries in the MENA. Iran is well-positioned to exercise a significant influence in basic materials sectors; especially cement, stone, and steel. The country is already the top cement exporter in the world and the largest cement producer in the Middle East. Iran is a net exporter of electricity to its neighbors and has an ample mineral wealth, including large cooper, lead, and zinc reserves. Iran's pistachios, saffron and of course caviar have brought great fame for its agriculture. It also produces a wide range of crops and is among the top five producers of eggplant, onions, and a range of fruits including quince, figs, and watermelons.

Science, Technology and Innovation in Iran at a glance

Enrolment in and Graduation from Tertiary Education in Iran

	2019-2020	2020-2021
Students	3,182,989	3,173,779
Graduates	577,526	———
PhD Students	242,821	266213
Enrolments	903,769	879,520

Gender Balance in Higher Education

2020-2021

High level of gender equality in both secondary and tertiary education compared to other countries in the Middle East

Source: Institute for Research and Planning in Higher Education

Job creation by Tech Companies

19,000 (2012) → 65,000 (2021)

Source: Ministry of Science, Research and Technology

Knowledge-Based Firms

	2023
manufacturing	5226
Startups	2794
Total	8020

Source: daneshbonyan.isti.ir, updated: January 29, 2023

The Number of S&T parks in Iran

33 (2012) → 49 (2021)

The Number of Incubators in Iran

131 (2012) → 223 (2021)

The Number of Knowledge-based Firms → 8020 (2021)

The Number of Creative companies → 1412 (2021)

The Number of Accelerators and Innovation Centers → 162 (2021)

Source: www.ir.undp.org

Iran's International Status in Scientific Productions

	Country	Documents	Citable documents	Citations	Self-Citations	Citations per Document	H index
1	China	860012	841099	846129	555970	0.98	1112
2	United States	726552	649063	844047	360630	1.16	2711
3	United Kingdom	243792	213389	352482	93373	1.45	1707
4	India	237429	219625	201943	83946	0.85	745
5	Germany	208210	189090	250210	75348	1.2	1498
6	Italy	154304	137883	212588	69980	1.38	1189
7	Japan	144778	135097	118780	35276	0.82	1171
8	Canada	130786	118499	165646	35023	1.27	1381
9	France	128210	116720	166511	36124	1.3	1352
10	Australia	125211	113751	182241	42937	1.46	1193
11	Russian Federation	123849	119249	63308	26591	0.51	675
12	Spain	122688	113361	147012	37834	1.2	1073
13	South Korea	101692	97947	105828	26648	1.04	810
14	Brazil	100085	94517	87295	24430	0.87	690
15	Iran	77346	74739	92339	31632	1.19	416
16	Netherlands	74317	67634	114391	21320	1.54	1206
17	Turkey	67150	62799	62890	16963	0.94	535
18	Poland	60788	57437	61977	18695	1.02	660
19	Switzerland	57331	52083	91539	15833	1.6	1142
20	Sweden	50270	46494	72654	12625	1.45	1036

Source: https://www.scimagojr.com/countryrank.php, 2021

Trends in Science Governance: A new generation of STI policies

The year 2010 was a turning point for science, technology and innovation (STI) policy in Iran. Up until this point, the emphasis had been on developing higher education and increasing the number of academic publications (1990–2000), followed by support for emerging technologies (2000–2010). The main result of this first generation of STI policies was greater academic productivity in emerging technologies, in particular, coupled with the creation of the first science and technology parks.

The founding of the Nanotechnology Initiative Council (2002) was a landmark of this period. These years also saw the adoption of the Competition Act (2007), followed by the establishment of the Competition Council in 2009 to serve as the main pillar of the law's implementation in the marketplace.

The second generation of STI policies dates from 2010 when the Vice-Presidency for Science and Technology drafted a bill that was subsequently enacted by parliament as the Law on Support for Knowledge-based Institutions and Companies and Commercialization of Innovation and Inventions (2011). This explicit focus on the knowledge economy was a first for Iran.

The National Innovation Fund was a practical expression of this law. Initially, the aim was to support university spin-offs but this support has gradually expanded to encompass tech-based startups and some eligible large enterprises such as CinnaGen or PersisGen, which are privately owned.

The third generation of STI policies dates from 2015 when parliament gave another boost to entrepreneurship and innovation through the Law on Removing Barriers to Competitive Production and Enhancing the Financial System. It is this law which led to the first innovation centers and accelerators in 2015.

This law was followed by the Local Content Requirement Policy (2016). It introduced a clause requiring international agreements and major national projects to 'include local technology and training.' This clause is now being implemented in national projects.

Another milestone has been the Law on the Expansion of Nanotech Utilization 2025 (2017). This law established a ten-year plan for transitioning from the stage of knowledge creation (technology push) to that of market expansion through the diffusion of nanotechnology in local industry and society (demand pull).

Notable in 2019 was the attempt to modernize public procurement procedures to leverage higher levels of local production, through the Law on Maximizing the Use of Local Capacity for Production and Services to address National Needs and Consolidate these Capacities to Enhance Exports.

Iran's judiciary established the Special Council for Dispute Resolution of Knowledge-based Companies and Elites in January 2020. It is based in Pardis Technology Park. A second council has been set up to address the legal problems faced by digital businesses.

For this third generation of STI policies, the Vice-Presidency for Science and Technology has shifted from a national innovation system approach, whereby government actors are the focal points of innovation, to developing an innovation ecosystem approach, whereby hubs of knowledge-based enterprises and tech-based start-ups are given support and their innovative capacity is linked to addressing national and industrial needs.

3 Waves of STI policies in Iran

Wave 1: Developing higher education and scientific publications (1990- 2000) followed by support for emerging technologies (2000–2010)	• An increase in academic productivity in emerging technologies; • Creation of the first science and technology parks; • Founding of the Nanotechnology Initiative Council (2002); • Adoption of the Competition Act (2007); and • Establishment of the Competition Council in 2009.
Wave 2: Developing research and emerging technologies (from 2010)	• Approvement of the Law on Support for Knowledge-based Institutions and Companies and Commercialization of Innovation and Inventions (2011); • Creation of the National Innovation Fund; and • Provision of support for university spin-offs and tech-based startups and some eligible large enterprises such as CinnaGen or PersisGen;
Wave 3: Transition towards innovation and a knowledge-based economy (from 2015).	• Approvement of the Law on Removing Barriers to Competitive Production and Enhancing the Financial System; • Establishment of the first innovation centers and accelerators in 2015; • Approvement of the Local Content Requirement Policy (2016); the Law on the Expansion of Nanotech Utilization 2025 (2017); and the Law on Maximizing the Use of Local Capacity for Production and Services to address National Needs and Consolidate these Capacities to Enhance Exports; • Establishment of the Special Council for Dispute Resolution of Knowledge-based Companies and Elites in 2020; • Development of an innovation ecosystem approach to support hubs of knowledge-based enterprises and tech-based start-ups and linking their innovative capacity to addressing national and industrial needs.

National Policy Documents on Science, Technology and Innovation (STI)

The governance model for the innovation system is inspired by the policy documents. These include the 2005 document, Vision 2025, drafted by the Expanding Discernment Council of the System (EDCS), the 2011 NMPSE (National Master Plan for Science and Education; also commonly called the Comprehensive Scientific Road Map), and other important policy documents listed in table 1. Together, these serve to guide the national STI policy agenda, with stipulated objectives, milestones and processes for implementation. Here, some of the overall policies on science and technology advised by the Supreme Leader and the National Policy for a Resilient Economy are presented, respectively.

Table 1
Key Policy Documents of Iran' s STI

Policy Measures/Documents	Year Approved
Law for Knowledge-based Production Leap	2022
Comprehensive Document of International Scientific Relations of IRI	2018
The 5-Year Development Plan (FYDPs) (containing STI-related articles)	The 6th FYDP approved in 2017
The Development Plans' Permanent Regulations Act	2016
Regulations of the Technology Annex and the Development of Internal Capabilities in the International Contracts and National Plans	2016
Removing Production Barriers Act	2015
Amendments to Government Financial Regulations Act	2015
National Policy for S&T	2014
National Policy for a Resilient Economy	2014
Act of Maximum Use of Production and Services to Satisfy the Country's Needs and Enhance them in Exports	2012
National Master Plan for Science and Education (NMPSE) (Iran Comprehensive Scientific Road Map)	2011
Law for Supporting Knowledge-Based Firms	2010
Act on Patents, Industrial Designs and Commercial Signs	2006
Vision 2025 Document: 20-year Vision Plan	2005
Law for Establishment of Ministry of Science, Research and Technology (MSRT)	2004
Foreign Investment Promotion and Protection Act	2002

Main National Policies on STI

• Local content and technology transfer policies

"The Maximum Utilization of Local Capabilities" law (MULC) and the "Technology Annex" are two policy measures aimed at increasing local content in Iran. The former was originally enacted in 1996 and revised in 2012. The latter, which was approved in September 2016 after nearly two years of discussion, parallels efforts to aid the development of knowledge-based products. It applies to those international contracts (including, inter alia, inward foreign investment and technology licensing) to which the government is a party or for which the government is providing support for building domestic firm-level STI capabilities. Its main purpose is to ensure that contracts, including purchase of technologies, are accompanied by collaboration with the foreign firm(s) to contribute to local learning and promote other spillovers.

The Technology Annex seeks to leverage international contracts to foster STI capacity-building and is aligned with – indeed complementary to – the MULC law. The law aims at enhancing local firms' capabilities in terms of R&D, design and engineering, to be stipulated in international infrastructure and industrial contracts. The general regulations and requirements in each contract are similar to the Technology Annex. The MULC law requires at least a 51 percent share of inputs by local parties in international contracts, with respect not only to raw materials and construction, but also to technology and skills. Effective industrial development will depend on how industrial policy is designed and implemented, keeping in mind the need to ensure sufficient transparency to avoid capture of policymakers by vested interests.

Key objectives of the national policy on science and technology promulgated by the Supreme Leader in september 2014 are as follows:

- Continuous scientific strives to get the authority of science and technology in the world with an emphasis on:
  - Developing science and innovation and theorizing;
  - Promoting global position in science and technology and becoming the scientific and technological hub in the Muslim world;
  - Developing basic science and fundamental research; and
  - Achieving advanced science and technology through special policymaking and planning.

- Optimizing performance and structure of the education and research system in an effort to achieve the objectives specified in the Vision 2025 Document in line with scientific development with an emphasis on:
  - Knowledge management and integration of strategic policymaking, planning and monitoring in science and technology domains and continuous promotion of the S&T indices and updating comprehensive scientific roadmap given global and regional scientific and technical developments;
  - Supporting establishment and expansion of science and technology parks and districts;
  - Identifying elites, developing exceptional talents, and retaining and attracting human capital; and
  - Increasing research expenditure to at least 4% of GDP by the end of 2025 with a focus on optimal resources utilization and productivity promotion.

- Improving the relationship between higher education, research and technology systems and other strategic sectors with an emphasis on:
  - Increasing the share of science and technology in the national income and economy, and improving national strength and efficiency;
  - Providing monetary and non-monetary support for idea-to-product process and increasing the share of high technology products and services and domestic technology in GDP as much as 50%; and
  - Developing and strengthening national and international communication networks between universities, research centers and the domestic and foreign technology development and innovation enterprises, as well as improving institutional cooperation in public levels given priorities of the Islamic countries.

- Developing active, constructive and inspiring cooperation in the field of science and technology with other countries and accredited scientific and technical centers throughout the world and the region, especially in the Islamic world along with strengthening the independence of the country, with an emphasis on:
  - Developing industries and services based on modern sciences and technologies and providing support for manufacturing and export of knowledge-based and indigenous technological products especially in priority areas through improving export and import performance in the country;
  - Taking necessary measures for technology transfer and acquiring knowledge to design and manufacture products in the country employing the capacity of the national market in consuming imported products;
  - Taking benefit of the scientific and technical capabilities of the Iranian expatriates and attracting prominent researchers and experts from other countries, especially the Islamic countries; and
  - Achieving authority in evaluating scientific contributions and providing opportunities for uptaking national and international research results, particularly from the Islamic world.

Comprehensive Document of International Scientific Relations of IRI

The “Comprehensive Document of the International Scientific Relations of IRI” was approved at meeting No. 805, dated March, 6, 2018 by the Supreme Council of Cultural Revolution.

The most important macro-level objectives:

- Realizing active scientific diplomacy for acquiring new knowledge and emerging technologies in the required and prioritized fields;
- Coordinated and coherent use of scientific capacities of the country to promote science and technology in other aligned societies and countries; and
- Promoting, disseminating, and transferring the country’s scientific and technological achievements with a focus on the national interests and macro-level policies of the country.

The most important strategies:

- Creating coordination and synergy between the related bodies and coherent policymaking with a view to developing international scientific cooperation;
- Developing transnational networks among scientists, students, academic researchers, research centers, S&T parks, and KBFs at home and abroad; and
- Intelligent development of scientific relations with other countries focused on comparative advantages of the country.

The most important measures:

- Strengthening and exploiting the capacity of the embassies and other active entities in the international arena for intelligent development of an international scientific relation system;
- Developing scientific and technological product/ service markets, especially the knowledge-based ones, in the target countries via purposeful diplomacy; and
- Developing international scientific cooperation through holding educational courses, projects, research centers and KBFs.

The Center for International Science and Technology Cooperation (CISTC) as the functional wing of the Vice-Presidency for Science and Technology (VPST) is responsible for implementing this document.

National Policy for a Resilient Economy: Technology and Innovation as the Key Factors of Economic Growth

The National Policy for a Resilient Economy has been promulgated by the Supreme Leader in February 2014 to push forward the policy agenda on local capabilities through adoption of a more outward-oriented development policy approach. Some of the main goals of the Resilient Economy are:

- Providing the necessary conditions and harnessing all facilities and financial resources as well as scientific and human capital to develop entrepreneurship;
- Creating a highly knowledge-based economy, implementing the NMPSE, and improving the NIS to increase proportion and production of knowledge-based products and exports;
- Improving the financial system of the country to support the influential parts of the national economy, such as S&T;
- Increasing exports of innovative and technological goods and services with an emphasis on their added value;
- Developing economic free zones in order to foster advanced technologies; and
- Expanding the discourse on the Resilient Economy, particularly in scientific, educational and media circles.

In order to implement the Resilient Economy policy, the government established a dedicated secretariat in mid-2015. The Supreme Economy Council (SEC) had already been selected in mid-2014, as the main body which approves Resilient Economy plans and projects. In this line, the secretariat approved 27 national plans, 10 of which are relevant to STI considering the national priorities:

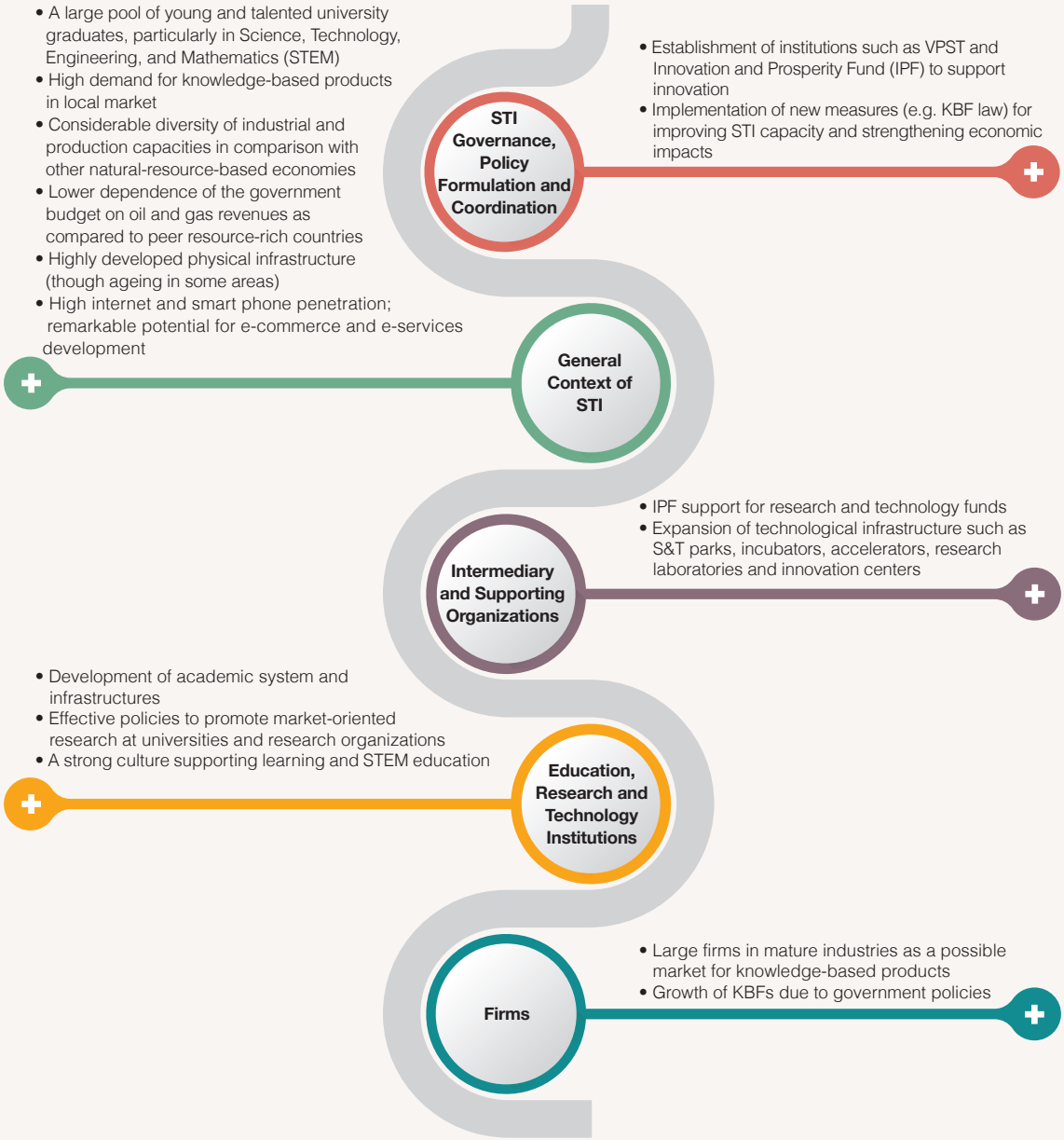
- Designing, organizing, implementing and monitoring the package of production and employment in 2018;
- Designing, organizing, implementing, and monitoring the supporting package of non-oil export development;
- Producing and broadcasting special programs by IRIB (Islamic Republic of Iran Broadcasting) aimed at removing barriers to manufacturing, encouraging investors, promoting domestic consumption and strengthening the resistance economy discourse;
- Developing market for knowledge products;
- Providing support for development of indigenous content and creating digital businesses on the platform of the National Information Network;
- Designing, organizing, implementing and monitoring the package for promoting business environment in 2018;
- Designing and implementing a mechanism for obligating Iran's foreign import partners (in selected fields) to transfer part of their production chain to the country;
- Providing support for creation and development of private specialized exporting companies;
- Providing support for Iranian cultural, artistic, and media products focused on developing domestic market and export; and
- Designing and implementing the water crisis transition program.

As transition to KBE is a collective effort, it requires engagement of different bodies, particularly the Ministry of Industry, Mine and Trade (MIMT) and MSRT. In this line, the Vice-Presidency for Science and Technology, as the main body for overseeing transition to KBE, is in charge of two important projects, broken down into two action plans:

- Developing technological interactions with the world economy and exporting knowledge-based goods and services through:
  - Creating 8020 supported Knowledge-Based Firms taking advantage of the facilities provided under the Law for Supporting Knowledge-Based Firms;
  - Designing and implementing pro-market policies to promote development of knowledge-based ecosystem in selected sectors (e.g. aerospace, biotechnology and nanotechnology, ICT, environment and oil and gas);
  - Creating and promoting development of markets, and using KBFs' capacities to provide at least 15 percent of the required local material and equipment; and
  - Promoting development of financing mechanisms (e.g. Venture Capital Funds (VCFs) and collateral) and insurance for knowledge-based production;

- Strengthening manufacture of innovative products through:
  - Developing infrastructures for export of knowledge-based products; and
  - Designing a holistic system for technology transfer and an implementation plan.

Iran's Strengths/ Opportunities in Transitioning to Knowledge-Based Economy



Source: UNCTAD

Iran's Status on the Global "Innovation Map"

In Iran, innovation ecosystem represents one of the main components of the digital economy in recent years. Review of Iran's global digital and innovation indexes and indicator ratings during the last 5 years shows very promising improvements in the field.

• Iran's Network Infrastructure

The growth in supply and demand with regard to online services correlates with the sharp increase in Internet penetration, especially mobile Internet. According to the Ministry of Information and Communications Technology of Iran, the number of internet subscribers in 2020 was 70.6 million people. Internet penetration rate of 84% is well above the world average. Additionally, the smartphone penetration rate in Iran in 2020 was estimated to be 69% which is relatively higher compared to the global average (49%). This means 58.2 million people in Iran have smartphones in their possession.

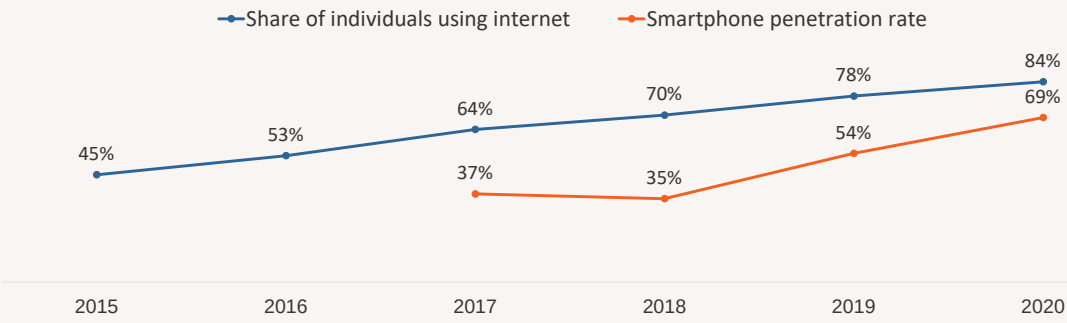
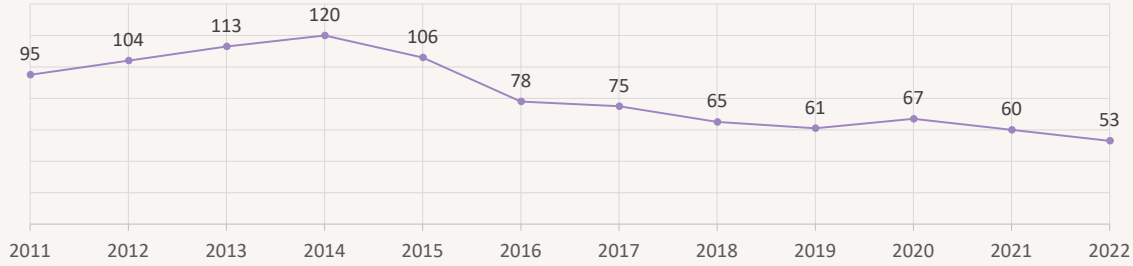


Figure 1: Iran's smartphone and internet penetration rate

Source: www.ir.undp.org

• The Global Innovation Index (GII)

The Islamic Republic of Iran is 2nd in the region once again, climbing to 53rd place in 2022, improving notably from the 95th place it held back in 2011 and establishing itself as a middle-income economy with the potential to transform the global innovation landscape.



Iran has jumped 42 places in the Global Innovation Index 2022 in comparison with that of 2011

Figure 2: Iran's rank in GII within 2011-2022

Global leaders in innovation in 2022

Top three innovation economies by region

Latin America and the Caribbean
1. Chile
2. Brazil ☆
3. Mexico ↓

Sub-Saharan Africa*
1. South Africa
2. Botswana ☆
3. Kenya ↓

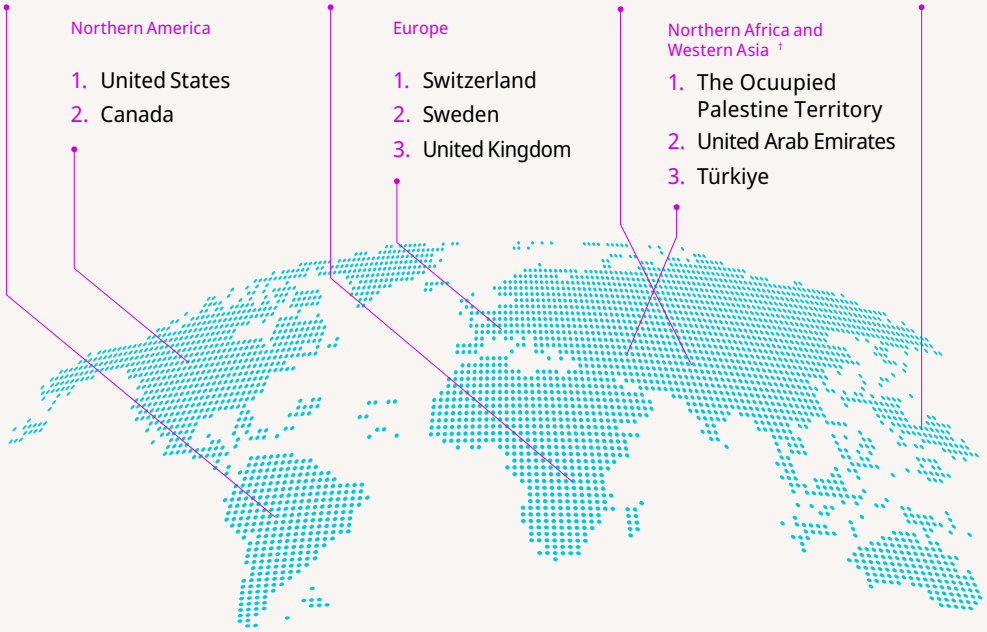
Central and Southern Asia
1. India
2. Iran (Islamic Republic of)
3. Uzbekistan ☆

South East Asia, East Asia, and Oceania
1. Republic of Korea
2. Singapore
3. China

Northern America
1. United States
2. Canada

Europe
1. Switzerland
2. Sweden
3. United Kingdom

Northern Africa and Western Asia †
1. The Ocuupied Palestine Territory
2. United Arab Emirates
3. Türkiye



☆ Indicates a new entrant into the top three in 2022.

↑↓ Indicates the movement of rank (up or down) within the top three, relative to 2021.

* Top three in Sub-Saharan Africa (SSA) – excluding island economies. The top four in the region, including all economies, comprise Mauritius (1st), South Africa (2nd), Botswana (3rd) and Kenya (4th).

† Top three in Northern Africa and Western Asia (NAWA) – excluding island economies. The top four in the region, including all economies, are as follows: The Ocuupied Palestine Territory (1st), Cyprus (2nd), United Arab Emirates (3rd) and Türkiye (4th).

Top three innovation economies by income group

High-income
1. Switzerland
2. United States ↑
3. Sweden ↓

Upper middle-income
1. China
2. Bulgaria
3. Malaysia

Lower middle-income
1. India ↑
2. Viet Nam ↓
3. Iran (Islamic Republic of) ☆

Low-income
1. Rwanda
2. Madagascar ☆
3. Ethiopia ☆

Source: Global Innovation Index Database, WIPO, 2022.

Notes: World Bank Income Group Classification (June 2021). Year-on-year GII rank changes are influenced by performance and methodological considerations; some economy data are incomplete (see Appendix I).

Global Innovation Index 2022 rankings

GII rank	Economy	Score	Income group rank	Region rank
1	Switzerland	64.6	1	1
2	United States	61.8	2	1
3	Sweden	61.6	3	2
4	United Kingdom	59.7	4	3
5	Netherlands	58.0	5	4
6	Republic of Korea	57.8	6	1
7	Singapore	57.3	7	2
8	Germany	57.2	8	5
9	Finland	56.9	9	6
10	Denmark	55.9	10	7
11	China	55.3	1	3
12	France	55.0	11	8
13	Japan	53.6	12	4
14	Hong Kong, China	51.8	13	5
15	Canada	50.8	14	2
16	The Ocuupied Palestine Territory	50.2	15	1
17	Austria	50.2	16	9
18	Estonia	50.2	17	10
19	Luxembourg	49.8	18	11
20	Iceland	49.5	19	12
21	Malta	49.2	20	13
22	Norway	48.8	21	14
23	Ireland	48.5	22	15
24	New Zealand	47.2	23	6
25	Australia	47.1	24	7
26	Belgium	46.9	25	16
27	Cyprus	46.2	26	2
28	Italy	46.1	27	17
29	Spain	44.6	28	18
30	Czech Republic	42.8	29	19
31	United Arab Emirates	42.1	30	3
32	Portugal	42.1	31	20
33	Slovenia	40.6	32	21
34	Hungary	39.8	33	22
35	Bulgaria	39.5	2	23
36	Malaysia	38.7	3	8
37	Türkiye	38.1	4	4
38	Poland	37.5	34	24
39	Lithuania	37.3	35	25
40	India	36.6	1	1
41	Latvia	36.5	36	26
42	Croatia	35.6	37	27
43	Thailand	34.9	5	9
44	Greece	34.5	38	28
45	Mauritius	34.4	6	1
46	Slovakia	34.3	39	29
47	Russian Federation	34.3	7	30
48	Viet Nam	34.2	2	10
49	Romania	34.1	8	31
50	Chile	34.0	40	1
51	Saudi Arabia	33.4	41	5
52	Qatar	32.9	42	6
53	Iran (Islamic Republic of)	32.9	3	2
54	Brazil	32.5	9	2
55	Serbia	32.3	10	32
56	Republic of Moldova	31.1	11	33
57	Ukraine	31.0	4	34
58	Mexico	31.0	12	3
59	Philippines	30.7	5	11
60	Montenegro	30.3	13	35
61	South Africa	29.8	14	2
62	Kuwait	29.2	43	7
63	Colombia	29.2	15	4
64	Uruguay	29.2	44	5
65	Peru	29.1	16	6
66	North Macedonia	28.8	17	36
67	Morocco	28.8	6	8
68	Costa Rica	28.7	18	7
69	Argentina	28.6	19	8
70	Bosnia and Herzegovina	28.5	20	37
71	Mongolia	28.0	7	12
72	Bahrain	28.0	45	9
73	Tunisia	27.9	8	10
74	Georgia	27.9	21	11
75	Indonesia	27.9	9	13
76	Jamaica	27.7	22	9
77	Belarus	27.5	23	38
78	Jordan	27.4	24	12
79	Oman	26.8	46	13
80	Armenia	26.6	25	14
81	Panama	25.7	26	10
82	Uzbekistan	25.3	10	3
83	Kazakhstan	24.7	27	4
84	Albania	24.4	28	39
85	Sri Lanka	24.2	11	5
86	Botswana	23.9	29	3
87	Pakistan	23.0	12	6
88	Kenya	22.7	13	4
89	Egypt	22.7	14	15
90	Dominican Republic	22.7	30	11
91	Paraguay	22.7	31	12
92	Brunei Darussalam	22.2	47	14
93	Azerbaijan	21.5	32	16
94	Kyrgyzstan	21.1	15	7
95	Ghana	20.8	16	5
96	Namibia	20.6	33	6
97	Cambodia	20.5	17	15
98	Ecuador	20.3	34	13
99	Senegal	19.9	18	7
100	El Salvador	19.9	19	14
101	Trinidad and Tobago	19.8	48	15
102	Bangladesh	19.7	20	8
103	United Republic of Tanzania	19.4	21	8
104	Tajikistan	18.8	22	9
105	Rwanda	18.7	1	9
106	Madagascar	18.6	2	10
107	Zimbabwe	18.1	23	11
108	Nicaragua	18.1	24	16
109	Côte d'Ivoire	17.8	25	12
110	Guatemala	17.8	35	17
111	Nepal	17.6	26	10
112	Lao People's Democratic Republic	17.4	27	16
113	Honduras	17.3	28	18
114	Nigeria	16.9	29	13
115	Algeria	16.7	30	17
116	Myanmar	16.4	31	17
117	Ethiopia	16.3	3	14
118	Zambia	15.8	32	15
119	Uganda	15.7	4	16
120	Burkina Faso	15.3	5	17
121	Cameroon	15.1	33	18
122	Togo	15.1	6	19
123	Mozambique	15.0	7	20
124	Benin	14.6	34	21
125	Niger	14.6	8	22
126	Mali	14.2	9	23
127	Angola	13.9	35	24
128	Yemen	13.8	10	18
129	Mauritania	12.4	36	25
130	Burundi	12.3	11	26
131	Iraq	11.9	36	19
132	Guinea	11.6	12	27

High-income
Upper middle-income
Lower middle-income
Low-income

Europe
Northern America
Latin America and the Caribbean

South East Asia, East Asia, and Oceania
Central and Southern Asia

Northern Africa and Western Asia
Sub-Saharan Africa

Source: Global Innovation Index Database, WIPO, 2022.
Note: For an explanation of classifications, see Economy Profiles, note 1.

GII 2022 rank

Iran (Islamic Republic of) 53

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$ (bn)	GDP per capita, PPP$
38	73	Lower middle	CSA	85.0	1,189.2	13,993

		Score/Value	Rank
Institutions		31.1	131 ○ ◇
1.1	**Political environment**	36.9	125 ○ ◇
1.1.1	Political and operational stability*	45.5	126 ○ ◇
1.1.2	Government effectiveness*	28.4	123 ◇
1.2	**Regulatory environment**	43.1	120
1.2.1	Regulatory quality*	8.5	131 ○ ◇
1.2.2	Rule of law*	23.6	113
1.2.3	Cost of redundancy dismissal	23.1	99
1.3	**Business environment**	13.3	129 ○ ◇
1.3.1	Policies for doing business†	22.0	124 ○ ◇
1.3.2	Entrepreneurship policies and culture*	4.6	70 ○ ◇
Human capital and research		35.0	54 ◆
2.1	**Education**	44.1	84
2.1.1	Expenditure on education, % GDP	3.6	94
2.1.2	Government funding/pupil, secondary, % GDP/cap	17.2	69
2.1.3	School life expectancy, years	14.6	59 ◆
2.1.4	PISA scales in reading, maths and science	n/a	n/a
2.1.5	Pupil-teacher ratio, secondary ◴	19.0	91
2.2	**Tertiary education**	46.4	21 ● ◆
2.2.1	Tertiary enrolment, % gross	58.2	53 ◆
2.2.2	Graduates in science and engineering, %	39.0	2 ● ◆
2.2.3	Tertiary inbound mobility, %	0.8	94
2.3	**Research and development (R&D)**	14.4	47 ◆
2.3.1	Researchers, FTE/mn pop. ◴	1,659.5	47 ◆
2.3.2	Gross expenditure on R&D, % GDP ◴	0.9	45 ◆
2.3.3	Global corporate R&D investors, top 3, mn USD	0.0	38 ○ ◇
2.3.4	QS university ranking, top 3*	25.8	43 ◆
Infrastructure		41.1	75 ◆
3.1	**Information and communication technologies (ICTs)**	65.4	86
3.1.1	ICT access*	88.0	63 ◆
3.1.2	ICT use*	68.2	58 ◆
3.1.3	Government's online service*	58.8	88
3.1.4	E-participation*	46.4	107
3.2	**General infrastructure**	43.3	31 ● ◆
3.2.1	Electricity output, GWh/mn pop.	3,869.7	55 ◆
3.2.2	Logistics performance*	37.2	63
3.2.3	Gross capital formation, % GDP	46.0	2 ● ◆
3.3	**Ecological sustainability**	14.7	125 ○ ◇
3.3.1	GDP/unit of energy use	4.2	125 ○ ◇
3.3.2	Environmental performance*	34.5	93
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	0.5	84
Market sophistication		56.8	11 ● ◆
4.1	**Credit**	27.1	65
4.1.1	Finance for startups and scaleups*	30.3	58
4.1.2	Domestic credit to private sector, % GDP ◴	66.1	52
4.1.3	Loans from microfinance institutions, % GDP	n/a	n/a
4.2	**Investment**	96.5	[1]
4.2.1	Market capitalization, % GDP	257.2	3 ● ◆
4.2.2	Venture capital investors, deals/bn PPP$ GDP	n/a	n/a
4.2.3	Venture capital recipients, deals/bn PPP$ GDP	n/a	n/a
4.2.4	Venture capital received, value, % GDP	n/a	n/a
4.3	**Trade, diversification, and market scale**	46.9	87
4.3.1	Applied tariff rate, weighted avg., %	12.1	126 ○ ◇
4.3.2	Domestic industry diversification ◴	92.4	38
4.3.3	Domestic market scale, bn PPP$	1,189.1	22 ●

		Score/Value	Rank
Business sophistication		18.7	115
5.1	**Knowledge workers**	19.2	[97]
5.1.1	Knowledge-intensive employment, % ◴	19.7	78
5.1.2	Firms offering formal training, %	n/a	n/a
5.1.3	GERD performed by business, % GDP ◴	0.2	53
5.1.4	GERD financed by business, %	n/a	n/a
5.1.5	Females employed w/advanced degrees, % ◴	7.6	83
5.2	**Innovation linkages**	18.1	107
5.2.1	University-industry R&D collaboration†	27.7	121 ◇
5.2.2	State of cluster development and depth†	44.4	81
5.2.3	GERD financed by abroad, % GDP	n/a	n/a
5.2.4	Joint venture/strategic alliance deals/bn PPP$ GDP	0.0	129 ○ ◇
5.2.5	Patent families/bn PPP$ GDP	0.0	86
5.3	**Knowledge absorption**	18.7	119
5.3.1	Intellectual property payments, % total trade ◴	0.2	95
5.3.2	High-tech imports, % total trade ◴	5.1	117
5.3.3	ICT services imports, % total trade ◴	0.5	113
5.3.4	FDI net inflows, % GDP	0.7	109
5.3.5	Research talent, % in businesses ◴	19.2	54
Knowledge and technology outputs		26.7	50 ◆
6.1	**Knowledge creation**	42.5	20 ● ◆
6.1.1	Patents by origin/bn PPP$ GDP	10.2	10 ● ◆
6.1.2	PCT patents by origin/bn PPP$ GDP	0.3	40 ◆
6.1.3	Utility models by origin/bn PPP$ GDP	n/a	n/a
6.1.4	Scientific and technical articles/bn PPP$ GDP	44.4	15 ● ◆
6.1.5	Citable documents H-index	22.1	39 ◆
6.2	**Knowledge impact**	27.8	65
6.2.1	Labor productivity growth, %	0.8	67
6.2.2	New businesses/th pop. 15–64	0.6	90
6.2.3	Software spending, % GDP	0.3	30 ● ◆
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	1.4	94
6.2.5	High-tech manufacturing, % ◴	38.4	29 ● ◆
6.3	**Knowledge diffusion**	9.8	103
6.3.1	Intellectual property receipts, % total trade ◴	0.0	90
6.3.2	Production and export complexity	33.4	78
6.3.3	High-tech exports, % total trade ◴	0.2	111
6.3.4	ICT services exports, % total trade ◴	0.2	127 ○
Creative outputs		31.8	33 ● ◆
7.1	**Intangible assets**	60.2	10 ● ◆
7.1.1	Intangible asset intensity, top 15, %	n/a	n/a
7.1.2	Trademarks by origin/bn PPP$ GDP	469.9	1 ● ◆
7.1.3	Global brand value, top 5,000, % GDP	0.6	76
7.1.4	Industrial designs by origin/bn PPP$ GDP	13.3	6 ● ◆
7.2	**Creative goods and services**	4.0	104
7.2.1	Cultural and creative services exports, % total trade	0.2	74
7.2.2	National feature films/mn pop. 15–69	1.7	50
7.2.3	Entertainment and media market/th pop. 15–69	3.0	52
7.2.4	Printing and other media, % manufacturing ◴	0.3	93 ○
7.2.5	Creative goods exports, % total trade ◴	0.1	97
7.3	**Online creativity**	2.6	78
7.3.1	Generic top-level domains (TLDs)/th pop. 15–69	1.8	80
7.3.2	Country-code TLDs/th pop. 15–69	7.1	46 ◆
7.3.3	GitHub commit pushes received/mn pop. 15–69	1.0	102
7.3.4	Mobile app creation/bn PPP$ GDP	0.5	81

NOTES: ● indicates a strength; ○ a weakness; ◆ an income group strength; ◇ an income group weakness; * an index; † a survey question. ◴ indicates that the economy's data are older than the base year; see appendices for details, including the year of the data, at https://www.wipo.int/global_innovation_index/en/2022. Square brackets **[ ]** indicate that the data minimum coverage (DMC) requirements were not met at the sub-pillar or pillar level.

Iran's Digital Economy

Iran has made considerable progress in providing opportunities to support the growth of the digital economy and innovation ecosystem in the country. Government support measures have resulted in a clear rise in the number of institutes and corporations engaging in the innovation ecosystem and the proliferation of players in the funding and support space in the country.
Prospects for the digital economy look promising, especially if investment is channelled into emerging technologies such as artificial intelligence, the Internet of Things and blockchain. The diffusion of Industry 4.0 technologies in mature industries such as the automotive, oil and gas and petrochemical industries should also favor their integration in the knowledge economy.
According to Statista, Iran's digital economy share of GDP has increased from 3.8% in 2016 to 6.9% in 2020. Moreover, Iran's ratio of the real value of e-commerce to GDP (oil excluded) reached 25% in 2020.

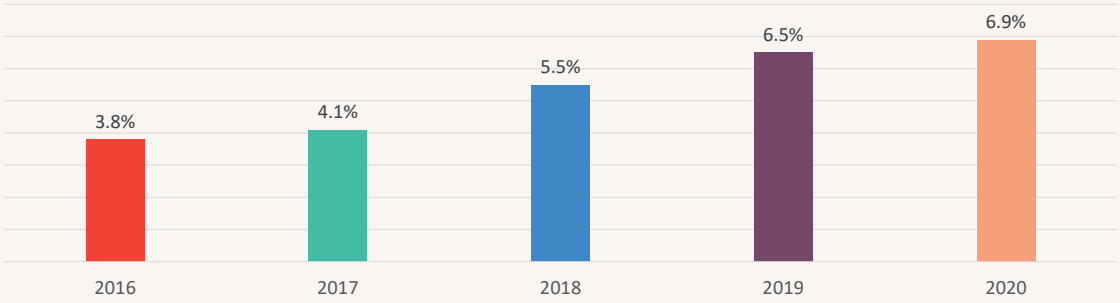


Figure 3: Iran's digital economy share of GDP
Source: www.ir.undp.org

According to the electronic card payment system of Iran (Shaparak), the electronic purchases over Point of Sales, internet, and mobile phones in Iran have passed USD 42 B. (USD/IRR 260,000) in 2020. According to the Statistical Center of Iran, this amount is 34% of the country's liquidity in 2020. This means that compared to 2019, the number of online purchases in Iran has increased by more than 2.5 times in 2020.
According to the e-commerce Development Center of Iran, the total number of ecommerce units is estimated to be around 350,000 units.

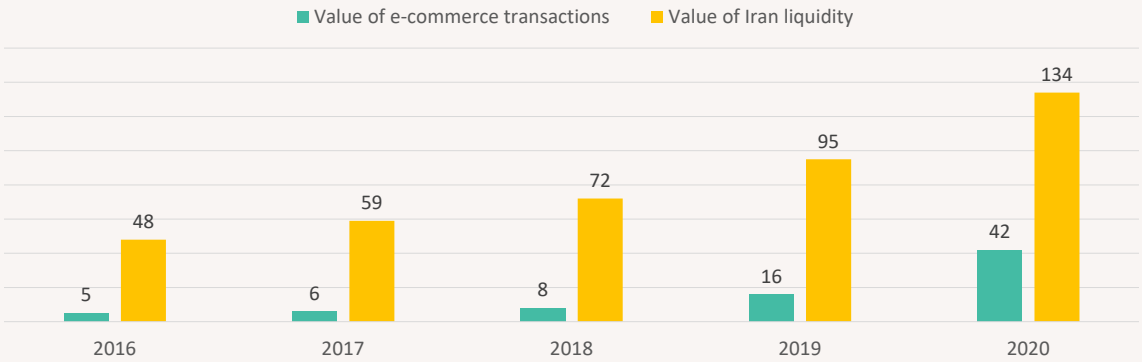


Figure 4: Value of e-commerce transactions and Iran's liquidity [B USD]
Source: www.ir.undp.org

According to the annual report published in 2020 by Digikala (one of the country's leading e-commerce companies), the number of online shopping portals is estimated to be approximately 49,000, which has more than tripled in the past 3 years. Likewise, the share of online retail of total e-commerce transactions in Iran increased from 2% in 2019 to 3.2% in 2020. This number is related to marketplace websites as well as social media. The map below illustrates Iran's share of online retail compared to other countries in 2020.

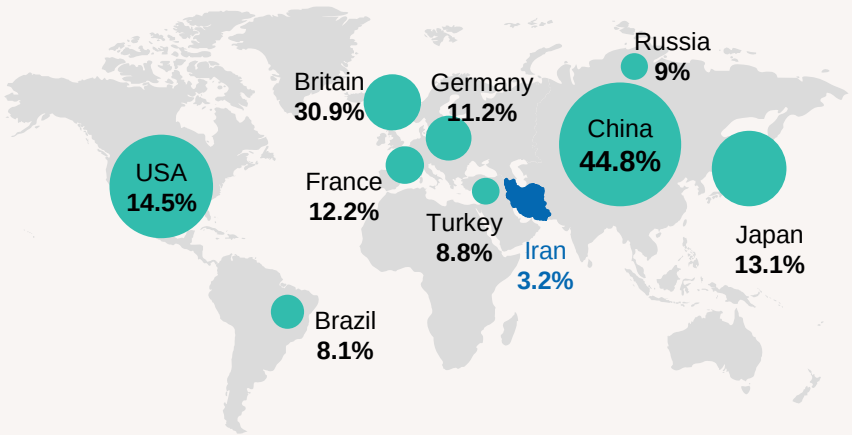


Figure 5: share of online retail in the world, 2020

Source: www.ir.undp.org

Iran's Startup Ecosystem

Although the first incubator in Iran was established in 2000, the first wave of startups in Iran started after 2012, thanks to the initiatives taken by several universities, visionary individuals, and the return of foreign educated Iranians.

The second wave of Iranian startups, appeared in 2016, with companies working in other sectors such as Financial Technology (Fintech), Insurance Technology (InsurTech), Video-on-Demand (VOD), and messaging apps.

The third and the current wave started when the US withdrew from the Joint Comprehensive Plan of Action (JCPOA) in 2018. However, restrictions can turn to opportunities and this is what happened in Iran. In the absence of international players, Iranians saw the opportunity and started to clone and localize the international platforms and services.

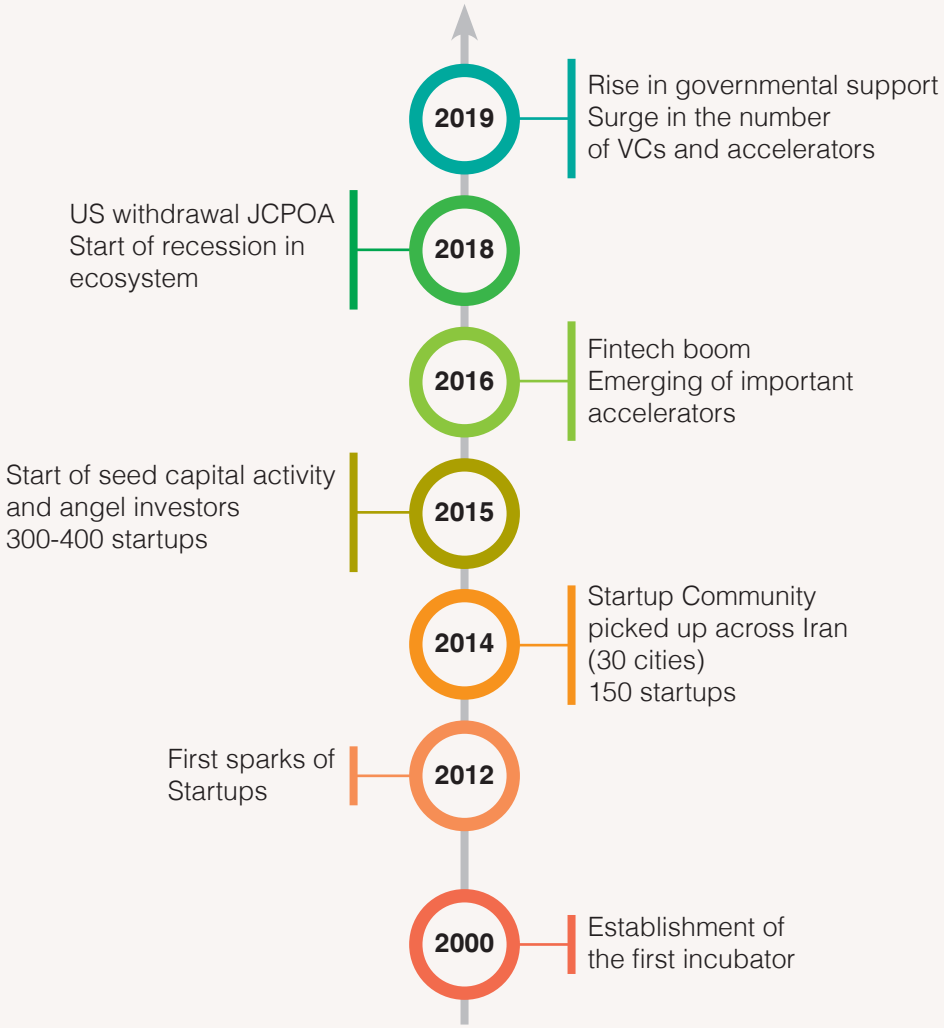
The government as one of the key players in Iran's innovation ecosystem, established Iran National Innovation Fund (INIF) in 2011, to assist the non-governmental institutions and companies in the commercialization of innovations by providing financial support to knowledge-based firms (KBFs), mainly in the form of a loan. INIF's loan allocation to KBFs has helped to create 8,371 new jobs and help maintain approximately 79k jobs during the past 3 years. The total financial support of the government increased from USD 9 M to USD 217 M in 2020.

During 2019-2020, government-backed bodies including National Development Fund and National Innovation Fund, provided government-backed plans for supporting startups, through which they allocate loans and grants to existing and emerging startups.

Between 2014 to 2020, the two institutions of the Vice Presidency for Science and Technology and the Ministry of Information and Communications Technology provided support for startups thorough different policy measures.

Throughout these years, the government has also tried to help entrepreneurs by easing the regulations and tax laws for early startups, through a "knowledge-based firms" plan. The government has supported VCs and accelerators by providing venue spaces on university campuses. Pardis Technology Park as "Silicon Valley of Iran" which also hosts many entrepreneurs, was funded by the government to help the tech sector.
Particularly, since 2019, after sanctions were re-imposed and in order to improve the concept of self-sufficiency, governmental support for startups increased sharply. The support included funding in the form of loans and direct investments (through Iran National Innovation Fund) and other incentives for building startup support facilities such as accelerators, innovation centers, and innovation factories. These policy measures resulted in rapid growth in the number of these centers between 2019 to 2020.

History of Iran's startup ecosystem



Source: www.ir.undp.org

Arguably one of the most notable institutional achievements of the past five years has been the overhaul of the National Innovation Fund. The fund has developed new financial tools like venture capital to nurture the knowledge economy, which is to be commended.
As illustrated in below figure, considerable support was provided through loans. Moreover, since 2019, there was a sharp increase in the fund allocation. The total financial support in 2019 and 2020 sums up to 87% of the total allocated fund in the past 5 years.

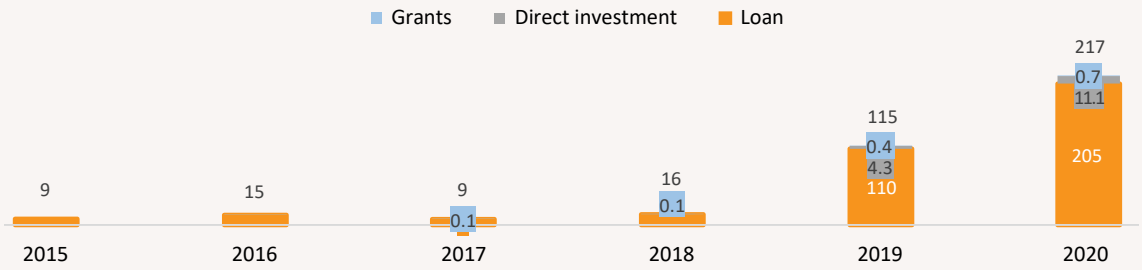


Figure 6: INIF financial support by type, M USD [2015-2020]
Source: www.ir.undp.org

The remaining loopholes in the institutional chain of the funding system for the knowledge economy can be plugged by supporting intermediary institutions, credit institutions, developing venture capital mega funds and by establishing a knowledge economy bank.
In the figure below, the INIF loan allocation in the period of 2018-2020 by type of application is presented. Working capital has the most considerable share in the total load allocations.

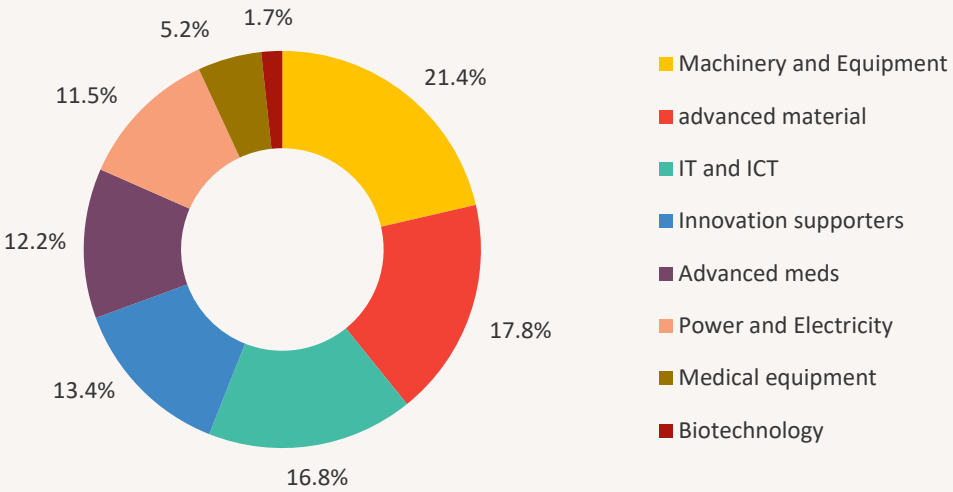


Figure 7: INIF loan allocation by sector, [2018-2020]
Source: www.ir.undp.org

As is shown below, the most common way of financing for startups is personal financing followed by VC resources. The frequency distributions are analyzed below.

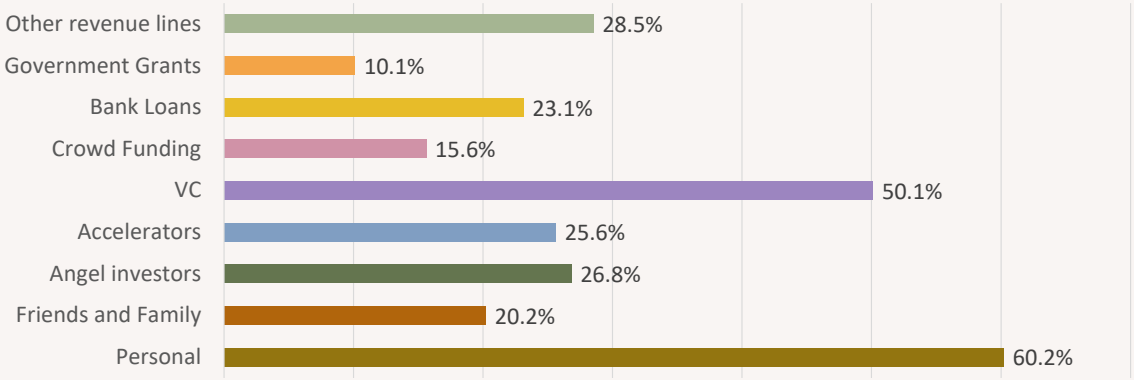


Figure 8: Surveyed startups in Iran financing methods

Source: www.ir.undp.org

Combined with heightened domestic demand, the multiplication of technology incubators and accelerators since 2015 has led to exponential growth in knowledge-based firms and start-ups. A series of laws and policies adopted since 2015 have removed barriers to competition and enhanced the financial support system for innovation. Here is an infographic of some of the well-known Iranian startups and their international equivalent.

Some Iranian startups and their international equivalent

Source: www.ir.undp.org




Science, Technology and Innovation Statistics

According to the 20-year Vision document, achieving the first place in science and technology in the region in terms of realization of the knowledge-based economy with an emphasis on software movements and scientific productions and acquisition of advanced knowledge and capability of producing science and technology are the most important goals in science and technology domains. Here, the descriptive and quantitative data on science, technology and innovation trends in Iran within the recent years are presented.

• Number of Higher Education Students by Gender and Educational Level

Totally 3173779 students were studying in Iranian universities in 2020-2021, of whom 49.2% were woman, showing a better gender balance in Iran than in other comparable countries of the region. Figure 1 depicts the distribution trends in different educational levels.

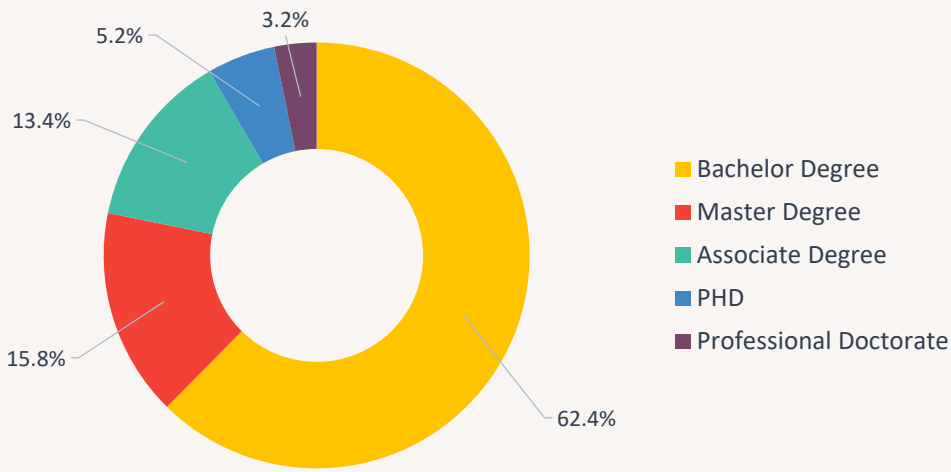


Figure 9: Students in Higher Education by Educational Level, 2019-2020

Source: Institute of Research and Planning in Higher Education

Trends in Iran's Scientific Production

Clarivate Analytics, Scopus, and ISC statistics indicate that volume of national and international scientific publications of the Iranian researchers has been constantly expanding over the past two decades and Iran has kept its scientific campaign run smoothly despite the international sanctions. According to Islamic World Science Citation Center (ISC), Iran ranks second in terms of publication output among the top 25 countries in 2019. With a growth rate of 10.4%, actually Iran is the second- just after China (12.9%) in the 25 top countries. Based on the Scopus database, Iran attains 4th rank in terms of citation impact engineering publications and 11th rank in terms of number of the same papers in 2020. Percentage share of Iran's scientific publications of total global scientific publications is 1.98% in 2020 and its contribution to global engineering publications is 2.7% raised from 1.7% and 2.4%, respectively, in 2010 and 2017.

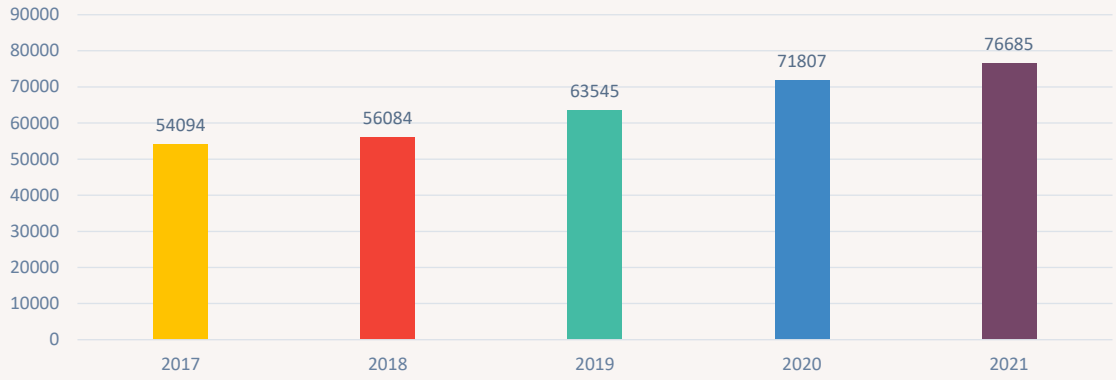


Figure 10: Iran 's Scientific Publications 2017-2021

Source: Web of Science

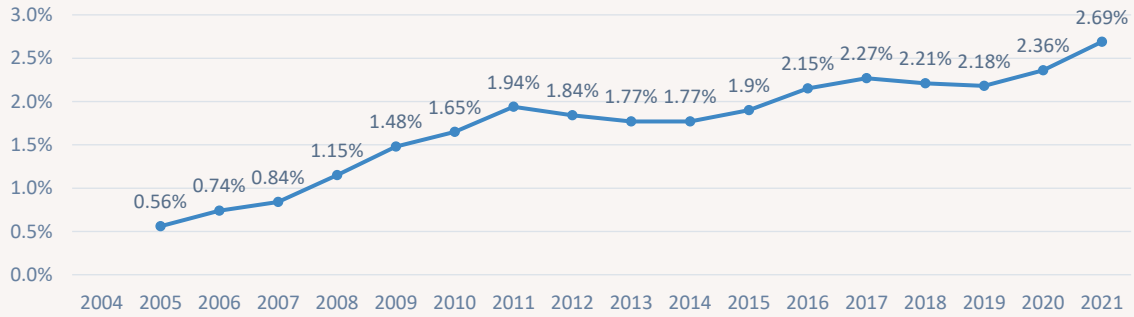


Figure 11: Iran's percentage share of world engineering publications 2005-2021 (Scopus)

Iran with a growth rate of 3.13% ranks 3rd among top 15 countries in engineering publications that has made a positive growth in 2021 as compared to 2020.

Iran has effectively managed to improve its rank (in normalized citation score of engineering publications) over the past decade: Iran's normalized citation score of engineering publications is 1.35 in 2021 which means Iran has performed 57% better than the world average. Total normalized citation score of Iran is 1.15, that is Iran has been more successful in engineering field (throughout the studied period performance of Iran in engineering has been better than country's total).

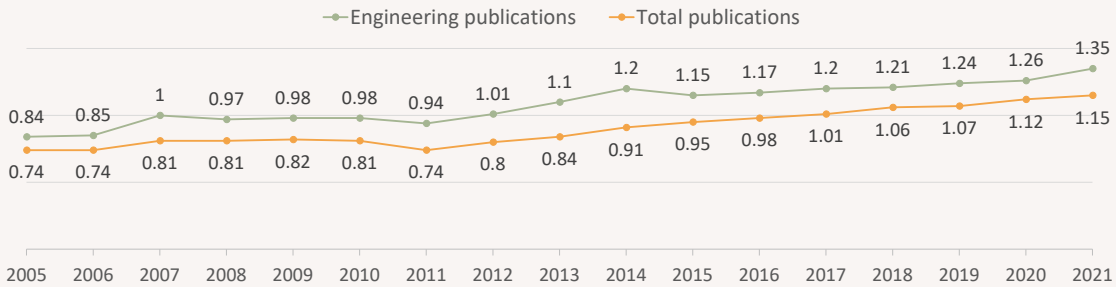


Figure 12: Field-Weighted Citation Impact of Iran's total scientific publications and engineering publications 2005-2020 (Scopus)

According to the Scopus database, Iran's percentage share of science diplomacy in 2021 has raised to 34%. A significant indicator for science diplomacy performance of countries is percentage share of internationally co-authored papers of countries' total scientific output which for Iran has increased from 17% in 2011 to 34% in 2021.

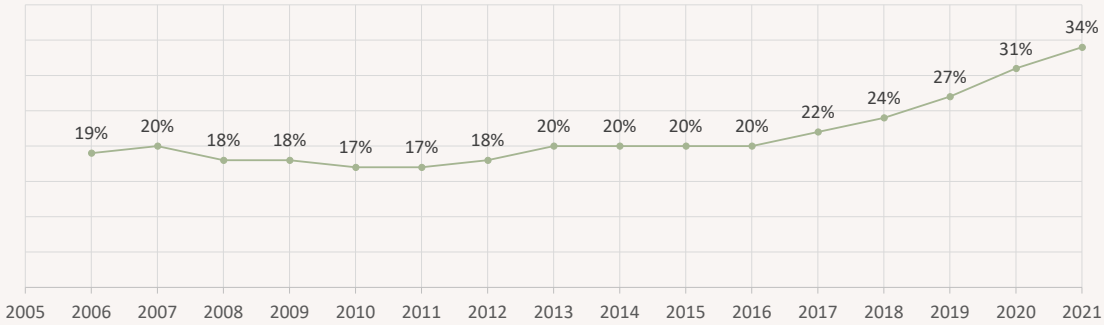


Figure 13: Percentage share of internationally co-authored papers of total scientific publications 2005-2021 (Scopus)

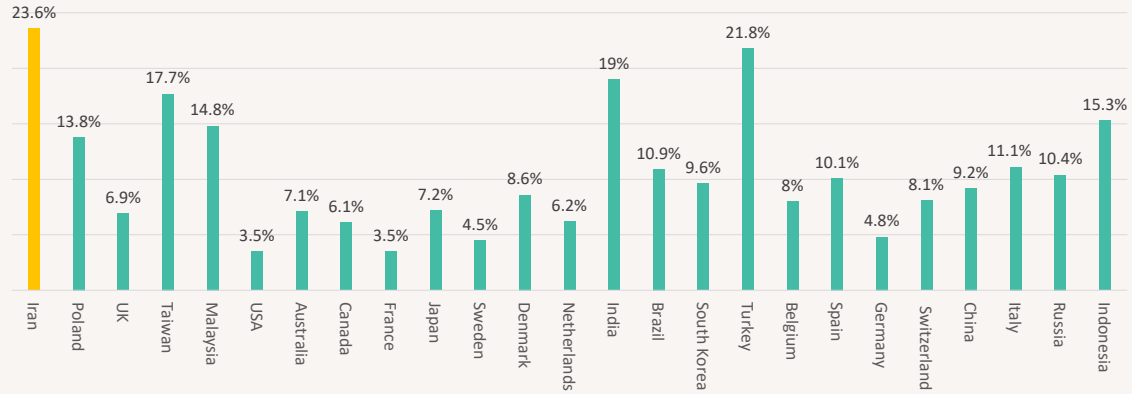


Figure 14: Science diplomacy growth in 2020 as compared to 2019 (Scopus)

Iran's global ranking in different fields of technology in terms of publications

Technology	Nanotechnology	Biotechnology	Bioengineering	Agricultural and Biological Sciences
Date	Dec. 2021	2021	2021	2021
Number of Articles	12236	1204	1021	845
Rank	4th *	12th	9th	17th

Biochemistry, Genetics, and Molecular Biology	Energy Engineering and Power Technology	Computer Science	Energy	Renewable Energy, Sustainability and Environment
2021	2021	2021	2021	2021
1078	2452	1523	891	2486
19th	11th	22nd	10th	11th

Fuel Technology	Cognitive Neuroscience	Aerospace Engineering	Ocean Engineering	Water Science and Technology
2021	2021	2021	2021	2021
1156	139	663	516	1656
10th	27th	8th	9th	6th

* https://statnano.com/report/r67
Source: https://www.scimagojr.com/countryrank.php: updated April 2022

• Status of Iran in World University Rankings

The government has sought to expand the higher education system including universities as the main strategy to improve its human capital. In Leiden's 2022 ranking, 44 universities from Iran are among top universities. Iran tops the Islamic countries with respect to the number of universities in Leiden's 2022 ranking. The following figure shows Iran's performance in terms of number of universities listed in Leiden's Ranking in 2012-2022.

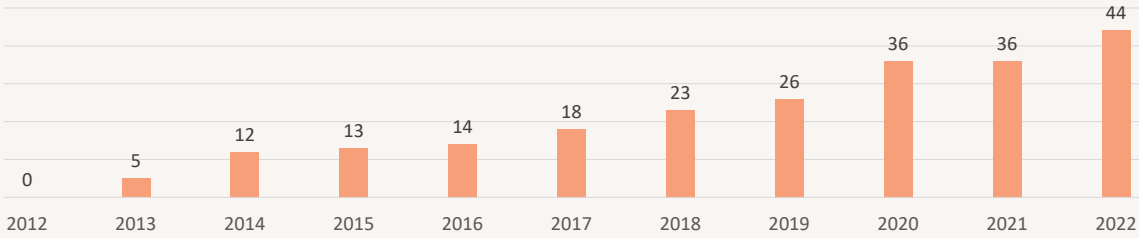


Figure 15: Number of Iran's universities in Leiden's Ranking 2012-2022

• Islamic Countries Position in Leiden's 2022 Ranking

The following figure presents number of universities of the Islamic countries in Leiden's 2022 ranking.

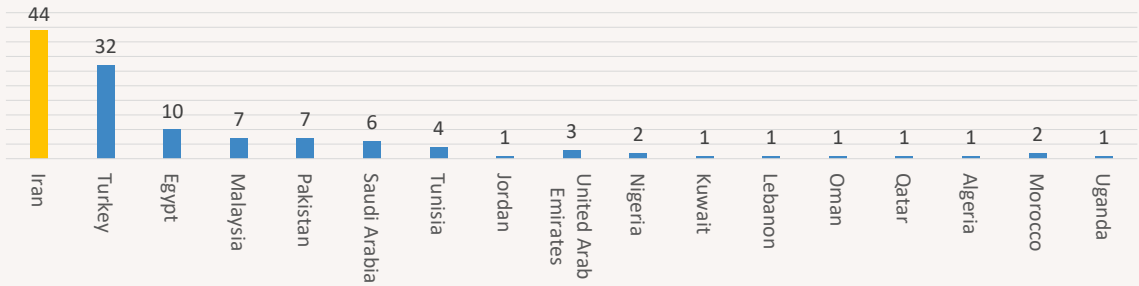


Figure 16: Status of the Islamic countries in Leiden's 2022 Ranking

• Science and Technology Parks

According to the Ministry of Science, Research and Technology, as of Nov 2021, there are 49 Science and Technology Parks across the country. There is at least 1 STP in each province and in some provinces, there are more than 1 namely; Tehran (12), Razavi Khorasan, Semnan, Markazi, and Hormozgan with (2) STPs each.

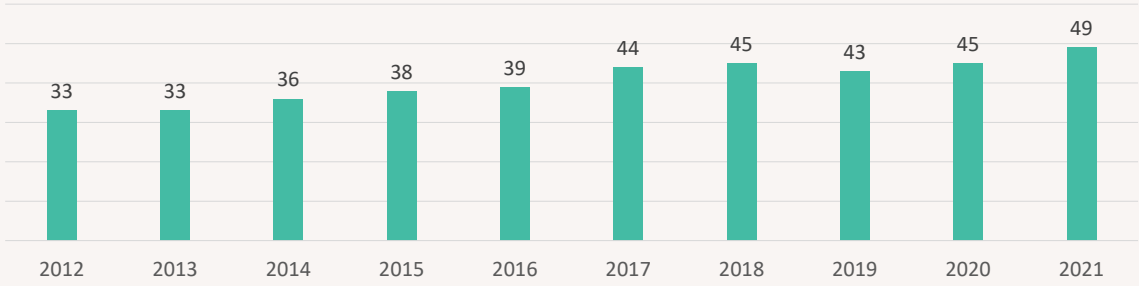
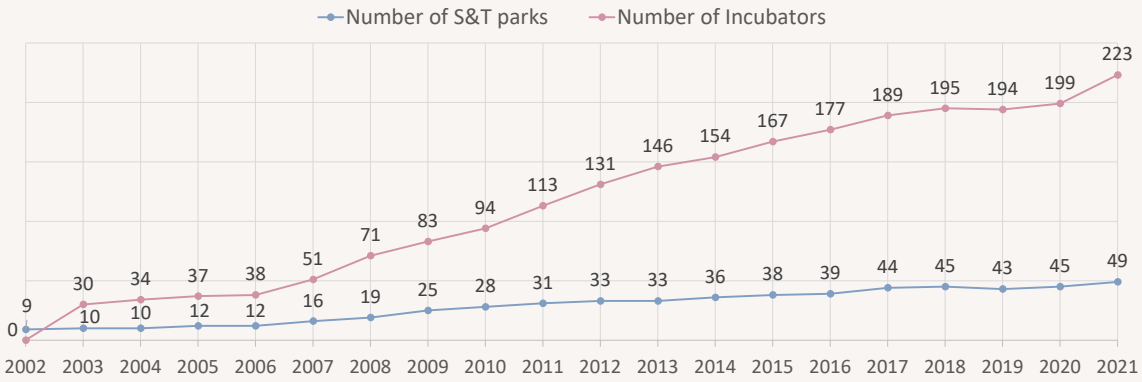


Figure 17: Growth in Number of S&T Parks during 2012-2021
Source: MSRT, www.msrt.ir/fa/techno/Files/.



Increase in the number of S&T parks from 33 in 2012 to 49 in 2021

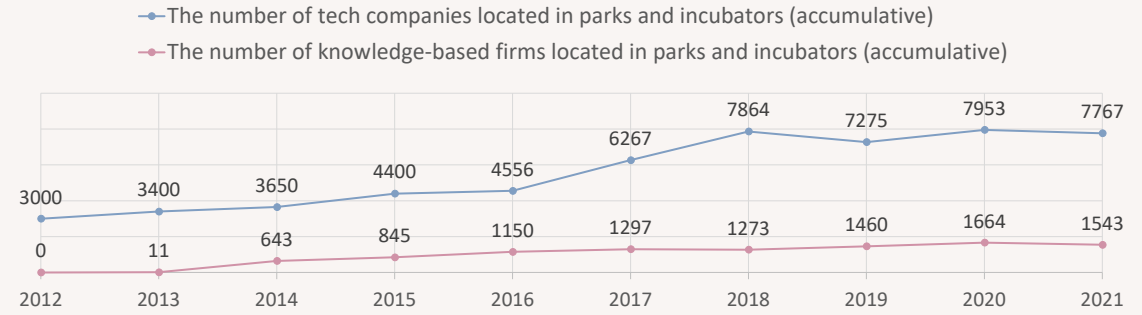
Establishment of the first private S&T park in 2017

Establishment of three public parks under the auspices of ICT Ministry, Ministry of Petroleum, and Ministry of Agriculture-Jahad

Increase in the number of incubators from 131 in 2012 to 223 in 2021

There are nearly 60 incubators, excluding S&T parks in the universities and research institutes

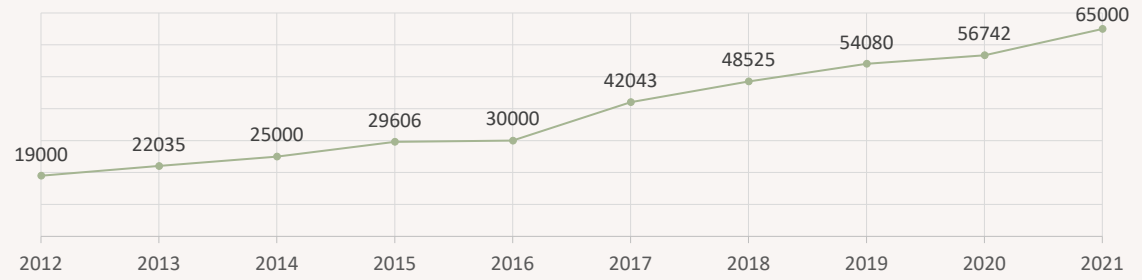
Figure 18: Growth Trend of Science and Technology Parks and Incubators
Source: MSRT, www.msrt.ir/fa/techno/Files/.



Increase in the number of tech companies from 3400 in 2013 to 7767 in 2021

Increase in the number of knowledge-based firms from 11 in 2013 to 1543 in 2021

Figure 19: Tech Companies and Knowledge-based Firms Located in S&T Parks and Incubators
Source: MSRT, www.msrt.ir/fa/techno/Files/.



Increase in the number of technologists working in S&T parks from 19,000 in 2012 to 65,000 in 2021

Figure 20: Job creation by Tech Companies
Source: MSRT, www.msrt.ir/fa/techno/Files/.

• Incubators

The first incubator in Iran was established in 2000. The number of incubators has had significant growth in recent years. According to the Ministry of Science, Research and Technology, the total number of incubators in Iran is estimated to be 223 by 2021.

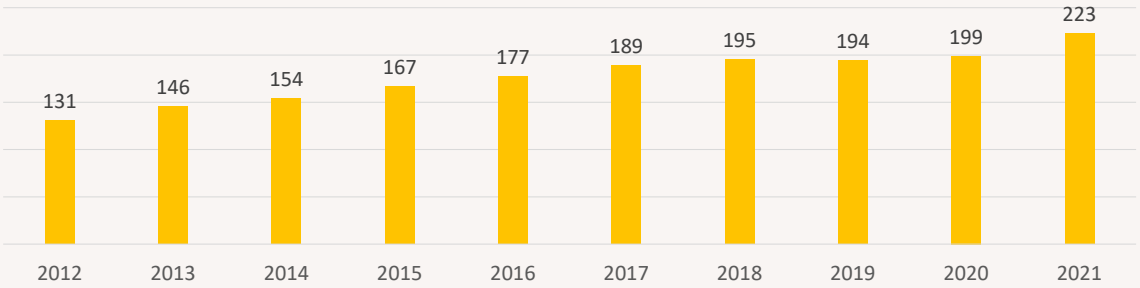


Figure 21: Growth in Number of Incubators during 2012-2021

Source: MSRT, www.msrt.ir/fa/techno/Files/.

Incubators may have the general focus or specialized in a specific industry depending on stakeholders' areas of interest. 35% of incubators in Iran are specialized in different industries. The incubators in Iran are mostly affiliates of Science and Technology Parks (61%) and Universities (25%).

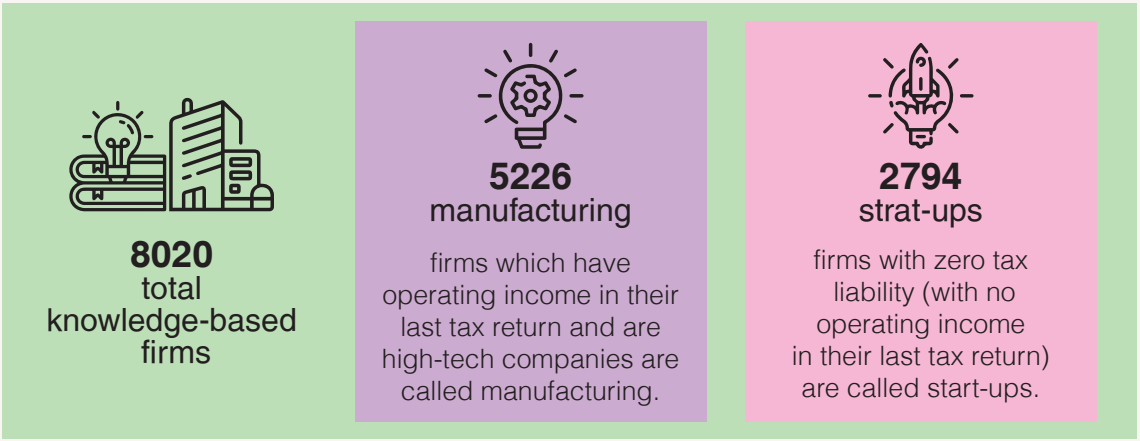
The dispersion of the 223 incubators in Iran is mapped in the figure below. The incubators are mostly located in the center and west of the country. However, there is no province with no incubator. The capital city of Tehran has the highest share in the country.

Mapping of incubators in Iran

Source: www.ir.undp.org

• Knowledge-Based Firms

After approval of the Law on Supporting Knowledge-Based Firms in 2010 and its implementation in 2013, various supportive mechanisms were developed for KBFs. Total number of Iran's KBFs mounts to 8020, from which 5226 are manufacturing and 2794 are start-ups.



Source: https://daneshbonyan.isti.ir, updated: January 29, 2023

Confirmed knowledge-based firms by technology category

Advanced materials and chemical-based products **No. 1128**	Medicines and advanced diagnostic and therapeutic products **No. 478**	Agriculture, biotechnology, and food industry **No. 361**
Electrical and electronic hardwares, laser and photonics **No. 1809**	Medical equipment and tools **No. 321**	Advanced equipment and machineries **No. 1720**
Cultural and creative industries and humanities and social sciences **No. 31**	Commercialization **No. 394**	ICT and softwares **No. 1778**

Source: https://daneshbonyan.isti.ir, updated: January 29, 2023

• Creative Companies

In addition to the formation of KBFs, there is another type of company under the support plan of the government, which officially came into existence in Iran in 2017 and was named "Creative Company". The main activity of creative companies is in the field of art, creative industries, culture, and digital services. Creative companies use creativity, innovation, and new business models in offering new products and services. However, the growth and development of their products and services are not based on advanced technology. The total number of creative companies in 2021 has reached 1,412.

• Accelerators and Innovation Centers

The total number of accelerators and innovation centers in Iran is estimated to be 162 by Nov 2021. 69% of accelerators in Iran are specialized. The figure below is presenting the share of specialized accelerators in different industries.

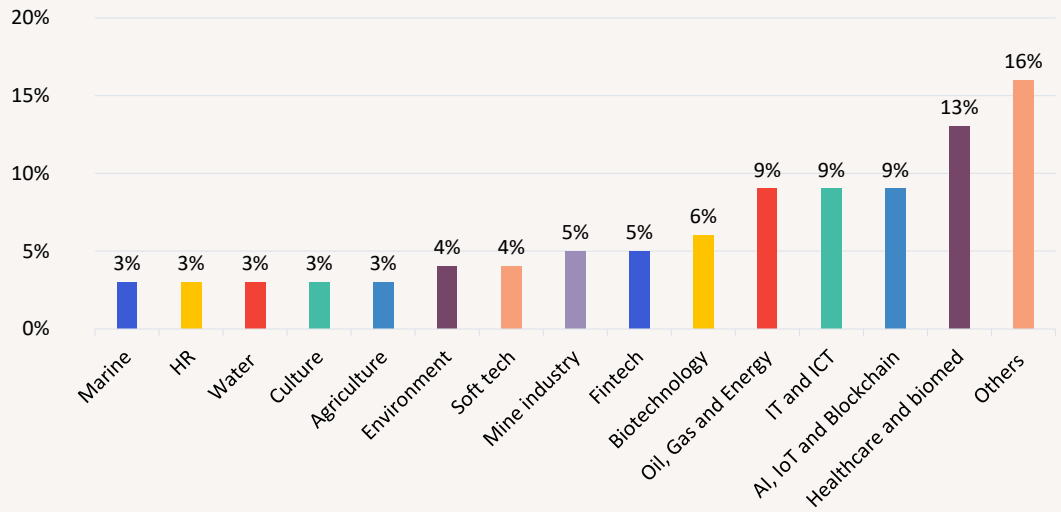
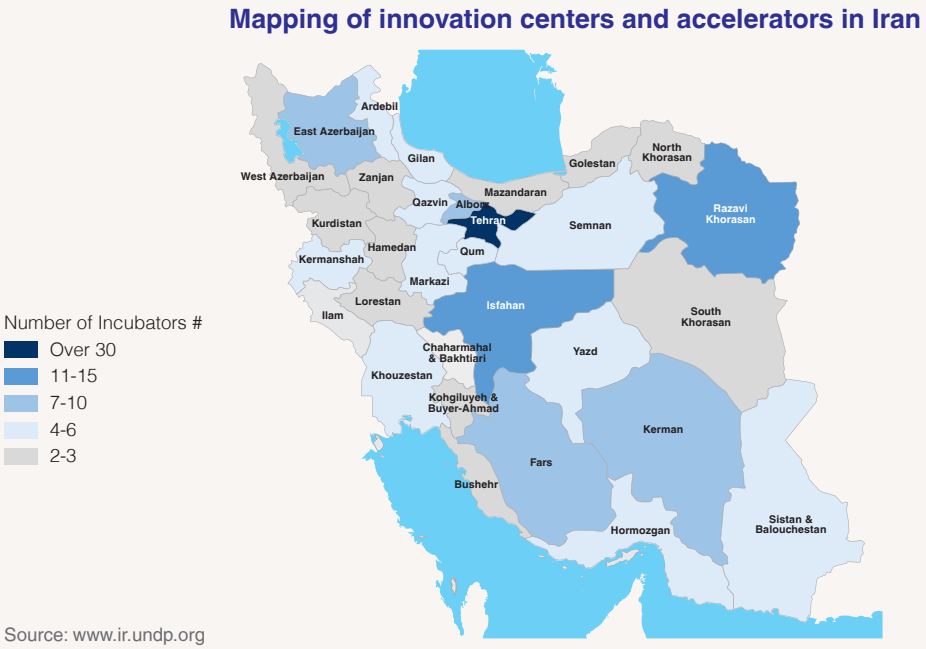


Figure 22: Industry field of specialized accelerators in Iran

Source: www.ir.undp.org

The dispersion of 162 accelerators in Iran is mapped in the figure below.



Source: www.ir.undp.org

Science and Technology Key Players

Iran's S&T system is marked by a variety of key players operating at different levels. Here, a brief overview of some key bodies is explained as follows:

• Supreme Council of Cultural Revolution

The Supreme Council of Cultural Revolution (SCCR) was established in 1984 upon official closure of universities. SCCR is the highest policymaking and legislative body for all stages of pre-university and academic education. Its resolutions do not require parliament's approval and become law automatically. Members of the SCCR include heads of the three powers of state, Minister of Education; Minister of Science, Research and Technology; and Minister of Health and Medical Education, as well as several cultural experts. Ministry of Education is responsible for all stages of pre-university education. Within the MSRT, technology development falls under a separate Vice-Ministry.

The vast scope of mission of the council includes all fields related to culture and science throughout the country. The council, then, is responsible for providing and approving principles, objectives, policies and programs related to the scientific and cultural issues, providing the cultural engineering map of the country and updating this map, formulating map of science, providing a plan to develop the educational system of the country, directing and reorganizing macro-management in cultural, educational, research and media organizations, and presenting efficient strategies for each field.

• Vice-Presidency for Science and Technology

The Vice-Presidency for Science and Technology (VPST) was established in 2007 to oversee innovation policy. It thus fulfills an important horizontal mandate to engage all relevant parties in supporting innovation as part of its oversight of innovation policy. Various powerful line ministries are provided with extensive resources earmarked for research and innovation within their specific realms of responsibility. The VPST's role in the innovation system as coordinator of innovation policy is of critical importance; it helps to establish a "whole-of-government" (or government-wide) approach characterized by effective cross-ministry collaboration on innovation policy. As one of the vice-presidential offices, it reports directly to the President and paves the ground for greater consistency and closer collaboration among various actors throughout the NIS. The VPST is also expected to link the governance and operational levels of the innovation system. Nowadays, this office is actively engaged in implementing innovation policy programs, coordinates the initiatives of innovation activities, and takes the ground for active presence of innovative firms, business and economic innovations, and design of innovation policy instruments.

The VPST has about 350 staff members in-house, plus consultants and experts based in other organizations to look after various tasks. The VPST does not necessarily try to pursue all tasks in-house; rather, for many activities it relies on the organizations with whom it collaborates. The main internal hierarchy of the VPST includes four deputies responsible for policy-making and strategic assessment, innovation and commercialization of technology, management development and resources and international science and technology cooperation. In addition, it has two special units, namely, the office of KBFs and the Pardis Technology Park (PTP) located just outside the capital, Tehran. PTP is considered to be the most pioneering technology park in the country which supports hi-tech companies to increase their competitiveness in the international markets.

• The Center for International Science and Technology Cooperation

The Center for International Science and Technology Cooperation (CISTC) was established in 2017 through merger of the Deputy for International Affairs and Technology Transfer affiliated to the Vice-Presidency for Science and Technology and the International Affairs Office of the National Elite Foundation.

As it has been already mentioned, CISTC is assigned to implement the Comprehensive Document of the International Scientific Relations of IRI introduced by the Supreme Council of Cultural Revolution to the Vice-presidency for Science and Technology in 2018. Developing cooperation and constructive interactions with other countries, international scientific and technological entities and foreign experts in line with achieving a leading position in the knowledge economy is considered to be the main mission of this center.

Promoting scientific partnerships and developing human resources by taking advantage of the capacity of foreign experts especially Iranian diaspora and brain circulation, expanding technological cooperation and exchange by using capacities of the international/foreign companies and entities in the field of technology development and exchange, and developing knowledge-based businesses through using the capacity of the international markets and facilitating entry of domestic KBFs as well as technology companies to such markets are among the main strategies of CISTC.

• Ministry of Science, Research and Technology

The Ministry of Science, Research and Technology (MSRT) is the main state ministry involved in higher education, science, research and technology. MSRT mandates to:

- Provide support and encourage universities and research institutes (public/private);
- Develop basic and applied research;
- Provide support for S&T parks and incubators;
- Focus on fields such as Engineering, Basic Sciences, Art, Humanities and Agriculture;
- Promote and support research through funding, human resource development and providing the necessary research facilities;
- Facilitate knowledge and innovation development in all scopes of science and technology including indigenous knowledge;
- Contribute to life quality improvement;
- Provide services to research community especially at higher education and research institutions.

In addition, MSRT is paying particular attention to implementing diplomacy of science and technology, traffic of academic collaborations, strengthening and improving national and international science and technology cooperation with its foreign partners including overseas universities and science and technology institutions.

In addition, there are other public or private institutions with related functions including the Ministry of Education which is responsible for primary and secondary education, the Ministry of Health and Medical Education, and other scientific and technological institutions affiliated with other public or private institutions in the country.

• Iran High-Tech Laboratory Network

The Iran High-Tech Laboratory Network (called LabsNet) was established in 2014 by the Vice-Presidency for Science and Technology with the aim of developing science and technology and creating the effective communication between laboratories and researchers

by sharing infrastructures and providing the universities and industrial researchers with laboratory services. LabsNet missions include improving quality of the high-tech laboratory services by standardization of laboratory activities, improving laboratory technicians' knowledge base through organizing training courses and experience-sharing sessions, and facilitating industrial and academic researchers' access to laboratory services.
Currently, LabsNet serves more than 1500 public and private laboratories in Iran. These laboratories include universities (45%), institutes and research centers (19%), companies (35%), and technology parks and incubators (1%). Figure 19 displays laboratories affiliated to High-Tech Laboratory Network.

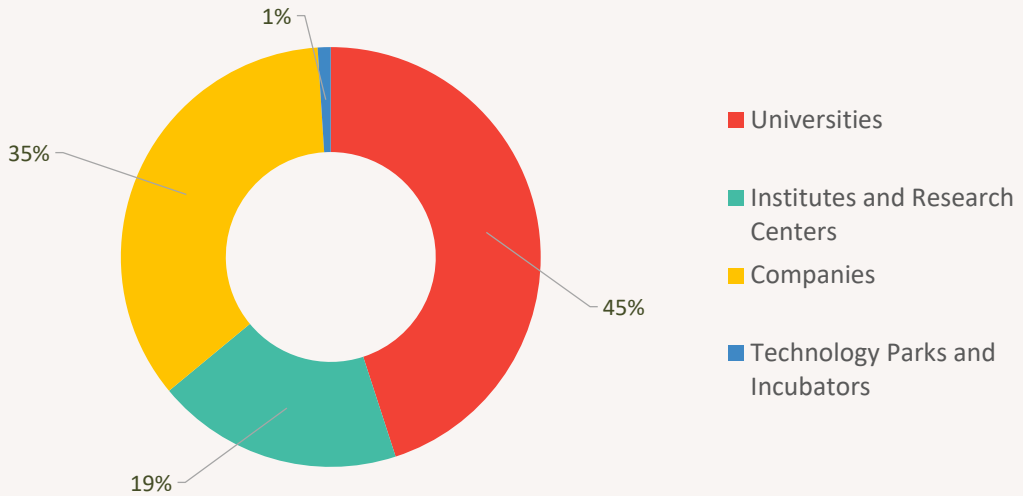


Figure 23: Laboratories affiliated to High-Tech Laboratory Network

LabsNet also covers a wide range of fields in high technology laboratory services such as Nano, Bio, Energy, Cognitive, Stem Cells, ICT, Herbal, etc. Also, it boasts:

- 1500 laboratory complexes (national) in 152 cities throughout the country;
- More than 10000 laboratory staffs;
- More than 28000 laboratory equipment (national); and
- More than 3 million lab services per year.

LabsNet provides its members with a unique opportunity to share their capabilities, experiences, and knowledge through the network and also creates funding opportunities for the renovation and/or standardization of facilities at member laboratories through the funds offered by the Vice- Presidency for Science and Technology.
LabsNet maintains a variety of international collaborations in different fields such as laboratory services, interlaboratory comparisons, training, standardization, renovation, and other projects of mutual interest. For this purpose, the International Unit of LabsNet was established in 2020. It is worth mentioning that 21 laboratories from 7 countries have joined this network so far.

• Center for Progress and Development of Iran

Since its establishment in 1984, the Center for Progress and Development of Iran (CPDI) has always tried to identify bottlenecks and neglected affairs in the progress of Iran, especially in the field of high technology, and to contribute to the advancement of these affairs in the country. This role is being played by informing and creating a discourse on the country's key opportunities and threats for progress, and participating in operational actions in order to actively engage with them (such as prototyping and modeling, institution-building, policy-making, and mechanism design). CPDI believes that the progress of the country will not be achieved, unless a consensus takes place between various stakeholders in the country, and the opportunities for international cooperation are properly exploited. For this reason, CPDI- as a consultant and facilitator- has a close relationship with all stakeholders, including executive agencies, universities and research institutes, private companies, specialists and scientists. This center also tries to identify international cooperation opportunities and establish constructive and continuous interactions with different countries and institutions.

Achieving these goals requires an agile and flexible organizational structure. Accordingly, CPDI, with the help of young elites in an ad-hoc structure, organizes emerging groups focused on various fields of progress to take special missions on the path to progress of the country. At present, the main focus of these groups is on the following axes:

- Identifying and monitoring emerging issues with great potential to create transformation, and trying to involve the country in such areas in a timely manner;
- Identifying opportunities and threats facing the country in resilient economy and knowledge-based economy, and trying to find effective ways of dealing with them;
- Monitoring and identifying management mechanisms and soft technologies, and trying to benchmark the successful ones and localize them.

• Innovation and Prosperity Fund

The Innovation and Prosperity Fund was established directly under the President in 2011 for the purpose of supporting KBFs both financially and non-financially. Since March 2017, it has funded 2117 projects with total turnover of $395 million. Moreover, high and medium-high-tech exports have dramatically increased from $1.5 billion in 2004 to $12.1 billion in 2014, which followed by turning the total trade balance positive in 2016.

• Iran National Science Foundation

The Iran National Science Foundation (INSF) was founded in 2003 by approval of Iran's Supreme Council of Cultural Revolution. For more than a decade, INSF has taken meaningful actions to provide a variety of support programs to Iranian researchers and scientists so that the gap between science and industry is bridged and the Iranian people can directly touch the impact of scientific development on their life quality. Currently, more than 70 percent of the faculty members and researchers from different universities and research institutes across the country are involved in various activities and projects defined by INSF.

The major activities of the foundation include providing support for innovation center development, research projects, and international patent application; holding scientific events, post-doctoral and short-term visit programs; and granting various research awards.

• National Elites Foundation

The National Elites Foundation was set up in 2004 with the aim of providing the innovators and leaders in science with financial and intellectual support. The organization offers different kinds of support to its members including scientific, monetary/non-monetary incentives such as granting low-interest or gratuitous loans, supplying any sources or laboratory facilities scarce in the country, involving the members with in-demand/priority national projects, assisting the members to commercialize their innovations or move them to the policy level, as well as providing them with other similar support services and networking opportunities.

In December 2013, a new department was created within the foundation, called the Deputy of International Affairs. It aims to harness talent of non-resident Iranians to improve domestic capacity in S&T and take advantage of experience of the diaspora. The foundation tailors its services to four different groups: Iranian PhD graduates from the world's top universities, Iranian professors teaching in the world's top universities, Iranian experts and managers heading the world's top scientific centers and companies in technological fields, and -last but not least- non-resident Iranian investors and entrepreneurs with successful experiences. The eligibility criteria were revised in 2014 to include groups and individuals based on their research expertise, experience, and academic performance.

• Pardis Technology Park

The Pardis Technology Park (PTP), as the most pioneering S&T park in the country, was established in 2005 under supervision of the Vice-Presidency for Science and Technology. PTP has been designed to commercialize technology achievements and create appropriate conditions for technology growth and hi-tech companies development through provision of high-end services; strengthening competitive advantage; and providing access to technology incubators, spin-off processes, and expert labor. It also meets the requirements of getting linked to the actual and potential global markets.

In January 2020 around 470 hi-tech companies were operating in PTP. The below figure represents technology combination of member companies.

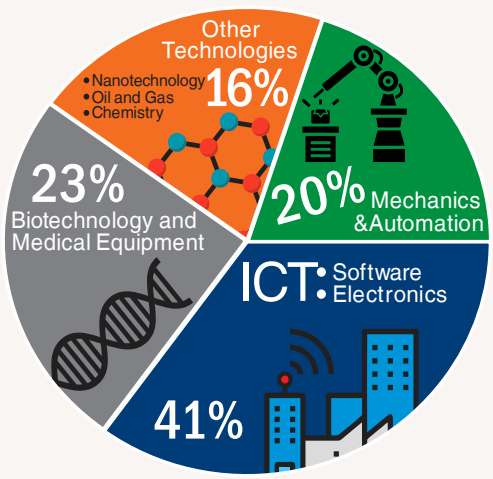


Figure 24: Combination of PTP Companies

• Innovation Acceleration Center

The Innovation Acceleration Center began its work in 2014 under supervision of the Pardis Technology Park (PTP) with the primary mission of entrepreneurship ecosystem reinforcement and start-ups growth acceleration in the country. Both the government and the private sector have collaborated and shared their equipment and experiences in order to empower entrepreneurship ecosystem.

Besides holding different entrepreneurship events, the center is responsible for establishing different accelerators as an effective measure to empower the startups and educate young entrepreneurs. Innovation Acceleration Center is looking forward to establishing co-working spaces for young entrepreneurs in order to build new teams and found new startups through collaborating with the startup community and the private sector.

• Iranian Venture Capital Association

The Iranian Venture Capital Association (IRVC) founded in 2012, is a non-governmental organization representing Iran's venture capital and angel investor sectors as well as accelerators and S&T funding organizations. More than 80% of Iranian VCs and accelerators are IRVC members.

Thanks to large network of investors and inventors, IRVC provides the accurate data and transparency on Iranian market to help investors make fact-based decisions on bringing in their own capital, innovation or expertise to the market.

By building a solid structure of active financing institutions, VCs and entrepreneurs in Iran, IRVC promotes professional investment in startups and new technology-based firms.

Some Key Players in Iran's Science, Technology and Innovation Ecosystem


Policy Formation
Policy Implementation
Intermediary Organizations
Research & Technology Institutions
Supreme Council of Science, Research and Technology
Supreme Council of the Cultural Revolution
Center of International Science and Technology Cooperation
Special Technology Development Councils
Knowledge-based Companies
Center for Progress and Development
Vice Presidency for Science, Technology and Knowledge-based Economy
Pardis Technology Park
Creative Companies
National Development Fund
Technology Accelerators
Innovation Centers
Centers for Medical Research and Technology
Iran National Innovation Fund
The Academic Center for Education, Culture and Research
Medical Universities
Ministry of Health and Medical Education
National Elites Foundation
Pasteur Institute of Iran


Center for International Scientific Studies and Collaboration
Other Ministries (Information and Communications Technology; Energy; Petroleum; Agriculture-Jahad; Defence and Armed Forces Logistics...)
Universities and Educational Research Centers
Iranian Research Organization for Science and Technology
Ministry of Science, Research and Technology
Incubators and Accelerators
Science and Technology Parks
Deputy Foreign Ministers for Economic Diplomacy
Institute for Political and International Studies
Ministry of Foreign Affairs
School of International Relations
Ministry of Industry, Mine and Trade
Iranian Mines & Mining Industries Development & Renovation Organization
Industrial Development and Renovation Organization of Iran
Center for Development of Technology and Advanced Industries
Ministry of Economic Affairs and Finance
Organization for Investment, Economic and Technical Assistance of Iran
Non-governmental Actors (including companies, institutes and centers involved in research and technology, Islamic Azad University, Funds, Scientific Associations, Non-profit Universities, Payame Noor University…)

Following the national development policy with an emphasis on realization of knowledge-based economy, compared with other oil-rich countries in the region, Iran has successfully accomplished to create the most diversified economy with the lowest dependence on oil and gas incomes. In line with the national innovation system, Iran is moving steadily towards a knowledge-based and innovation-based economy and seeks to reinforce its productive capacity, encourage international collaboration to exchange technology and engage more actively in innovative activities to foster economic growth and sustainable development.