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"A Brief Review of Science and Technology and SMEs Development in I.R Iran"

A Brief Review of Science and Technology and SMEs Development in I.R Iran

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Introduction

The Islamic Republic of Iran has pursued a development strategy of self-reliance with some degree of success. Endowed with abundance of oil and natural gas resources, Iran did not face any balance-of-payment constraints vis-à-vis its import. Yet, it adopted an import substitution policy that allowed it to use its oil revenues to acquire foreign technologies to industrialize. Iran is a middle-income developing country, with a broad industrial base, a relatively well developed science and technology infrastructure and skilled manpower.

However, Iran still remains largely a natural-resource-based economy. Diversification is an imperative, not only because natural resources become more accessible but also because export success in world markets increasingly demands knowledge-intensive production and innovation-based competition. Above all, there is need to provide quality jobs for 800,000 skilled work force that enter the labour market every year.

The shift towards a more knowledge-based economy will require creating a national innovation system based on science and technology that would not only merely transfer ready-made technologies, but also engage in re-invention, developing new technologies and diffusing them economy-wide. There is need to better link the science and technology infrastructure to the needs of the productive sector generally and in particular building up capabilities in high technology areas.

Iran's economy

Iran's economy is largely dependent on the primary sector. The agriculture and the oil and gas sectors together account for 32 per cent of GDP during 1991-2003; the industrial sector accounts for 20 % (including water supply, electricity and gas). This figures has changed to different mixture in 2009(see Table 1). Iran's manufacturing industry has been built up mainly through licensing of technology from abroad and in some cases through reverse engineering. State-owned enterprises which are mainly large enterprises continue to account for much of the industrial sector. There is need for promotional policies for SMEs and related measures to encourage entrepreneurship in Iran, such as provision of seed capital and venture capital and the establishment of science and technology parks and business incubators with adequate funding and support services to assist start-up enterprises.

Table 1. Average contribution of Economics sectors to GDP (%)

Sector	**2009**
Agriculture	10.9
Industry	45.2
Services	43.9

Source: Central Bank of the Islamic Republic of Iran and World Bank data.

Since 1990, Iran’s economic plans have emphasized a gradual move towards a market-oriented economy and development of the private sector. Recently, the number of reforms was approved by the government are as follow:

- Approval of the Foreign Investment Promotion and Protection Act, aimed at simplifying the inflow of foreign capital and easing of technology transfer from abroad;
- Liberalization of foreign trade through the elimination of non-tariff barriers and regulations for contract deposit;
- Equalization and reforming the system of exchange rates, aimed at increasing transparency in the government budget and subsidies;
- Direct Tax Law reform, consisting in the reduction of corporate taxes from 54 to 25 per cent and personal income tax rates from 54 to 35 per cent;
- Banking System reform, through the establishment of non-banking credit institutions and private banks.

Iran's national innovation system (NIS)

The main actors in the Iranian national innovation system are government, research institutes/universities and enterprises. The irony is that almost all of the research institutes/universities and an overwhelming majority of the enterprises are also state-owned. That said, due to this government ownership, there are close links between the research institutes/universities, enterprises and government. Other actors such as business corporations, business supporting organizations and consumer groups are very weak and play almost no role in the system. As a result, user-producer relation is weak and innovation activities in Iran are not very much demand-driven. The absence of private enterprises that base their innovation strategies on conditions of demand and

competition makes it difficult to derive larger economic benefits from innovation. Such larger benefits that Iran is not, presently, realizing would include opportunities for commercializing new products, emergence of spin-off enterprises and new entrepreneurs, etc.

Competition

Competition is the key driving force for innovation and technological change. Iran's industrial sector lacks effective competition. The system of licenses and resource allocation (subsidies) ensures that there is only limited competition (and mainly based on price) in the vast majority of industries. This lack of or limited competition does not motivate companies to develop new products or product features. Recognizing this, the Government is gradually opening up the economy to competition, but the process is very slow.

Foreign direct investment (FDI)

A unique feature of Iran's innovation system is the marginal role played by foreign companies (see table 2). Foreign companies bring in new technologies in the form of new products, processes and management techniques. The local operations of foreign companies lead to spill over effects and diffusion of new technologies into the wider economy. They also spur competition and motivate domestic companies to upgrade their technologies and innovate in order to compete. The Government has established free zones where foreign companies can locate operations, which this can create a new opportunities for FDI

Science, Technology, and Innovation Policy System

Now, there are some main actors in Iran's innovation policy system: The Supreme Council of Cultural Revolution (SCCR), the Ministry of Science, Research and Technology (MSRT), the Ministry of Industry and Mines (MIM), the Ministry Of Agricultural Jahad, the Ministry of Health, Treatment and Medical Education (MOH) and The Technology Cooperation Office (TCO). Prior to Islamic Revolution in 1979, Knowledge generated through higher education and scientific researches were the core functions of the Ministry of Science. In 1985 medical education and research was assigned to a new Ministry of Health, Treatment and Medical Education (MOH) which also licenses technology imports for the pharmaceutical sector although the Ministry of Industry and Mines nominally has responsibility for the latter.

The Supreme Council of Cultural Revolution (SCCR) is the highest policy making and the 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, Ministers of Education (MOE), Science, Research and Technology (MSRT) and Health and medical education (MHME), as well as several cultural experts. Ministry of Education (MOE) is responsible for all stages of pre-university education. Within the MSRT, technology development falls under a separate Vice Ministry.

Some work in the area of technology policy is underway, mainly through the activities of the Iranian research organization for science and technology (IROST). It provides technical and some financial support to small and medium-sized enterprises (SME). To some extent, therefore, IROST acts as a granting council, receiving proposals from researchers in SME when they require funds to develop a prototype, pre reviewing the proposals and making awards. This is part of a joint program MSRT/ IROST/ Vice president for Strategic Planning/ private sector/ institutes to support innovation projects up to the experimental development scale and encourage public-private partnerships in the process.

The MSRT, therefore, plays a relatively small role in the funding innovation projects, but it has a strong position in scientific research and technological development [1].

Technological Capacity in the Industrial Sector

Two specific policies introduced during the period of reconstruction have attempted to reorient research more towards industry. The first was to promote applied research with a view to making university research applicable to industrial needs. During the 1990s, the Ministry of Industry also sought to directly promote research and development activities in large and medium-sized companies, most of which were state-owned. By 1996, 158 companies had received official operating licenses for their R&D centres [3]. The MSRT's Report on Private Sector Research Institutes (2003) notes that, by 2000, 76 technical and engineering research institutes have been created in the enterprise sector (including public and private enterprises). The earliest was established in 1971, followed by three others in the 1970s, 17 in the 1980s, 52 in the 1990s and two in the year 2000.

Of relevance to the role of research in industrial innovation is the relatively small proportion of researchers located in private research centres. In 1996, the total number of researchers, research assistants and technicians amounted to 68,385, of which 82 percent were employed in public sector institutes and 18 per cent in private sector research centres.

Apart from building up capacities in the knowledge system, Iran has also built up substantial technological capacity in the productive sector. It has a fairly well developed manufacturing capacity in the automotive industry, telecommunications and pharmaceuticals. But the knowledge system has not percolated into the production system properly. Enterprises only undertake production, and do not perform innovation activities. While such a strategy was sufficient to cater to an import-substitution economy, it does not result in a dynamic capability for sustainable development. Moreover, even large manufacturing enterprises rely on imports for inputs. This is mainly because of the absence of strong support industries (supplier networks in the form of small and medium-sized enterprises) in Iran. Small and medium-sized enterprises make a relatively very small contribution to the national product.

Large enterprises (which are mainly state-owned), by developing technologies relating to components and parts and diffusing these technologies to SMEs, can build up a

strong supplier industry within the country. Several other developing countries such as India and China have followed such a strategy. SMEs create employment and are dynamic, adapting to economic changes relatively quickly. SMEs are also observed to be more innovative than large enterprises.

The experience of many countries has shown that the Small and medium-sized enterprises (SMEs) can make a substantial contribution to industrial and economic development.

Unfortunately, Iranian statistics relating to SMEs are scattered and incomplete. The number of small and medium sized *industrial* SMEs however around 345,000 formally registered businesses, of which 96.1% belong to the category of micro-enterprises (with a workforce of 1-9 employees), 3.3% to the category of small enterprises (with 10-49 employees), 0.3% to medium-sized enterprises (with 50-99 employees), and 0.4% to businesses larger than 100 employees. As the present study shows, these industrial SMEs provide approximately 1.3 million jobs, out of a total employed labour force of 15.6 million.

In this context,98.4% of all businesses are micro enterprises with 1-9 employees, whereas the total of small businesses with 10-49 employees amounts to only 1.42%. Obviously, there is an imbalance between the large number of micro enterprises and the marginal number of small and medium sized businesses. It may be noted that the absence of a reasonable number of medium-sized enterprises, which amounting to only 0.1% of the total number of enterprises, is negatively affecting Iran's ability to produce for the export market

The Agricultural Jihad Ministry is responsible for small agro-based and rural industries. The number of enterprise by type, size and employment is summarized in table 2.

Table 2. Number of Enterprises by Size and Sector

The Type of Enterprise	**1-5 employees**	**6-9 employees**	**10-49 employees**	**50-99 employees**	**More than 100 employees**
Services	878774	5631	3478	231	150
Productive	334630	17125	13236	1055	1207
Mine	454	355	413	-	-
Total	1213858	23111	17127	1286	1357
% of Total	96.6	1.8	1.4	0.1	0.1

Source: [7]: UNIDO,(2003)

Small businesses suffer from similar obstacles as in other developing countries. These include: a poor macroeconomic environment of high inflation (about 20 per cent, with a fluctuation of 9–10 per cent) and high interest rates; burdensome regulations; adverse labour and tax laws; lengthy and arbitrary procedures for securing bank loans; foreign currency shortages; lack of competent business development services; and an overall sense of discrimination against small enterprises. The main barriers to SME development in Iran is Lack of access to various kinds of information, including:

- Marketing information (on domestic and foreign markets, price structures, packaging requirements, etc);
- Information on the financial and technological standing of SMEs to enable investors to select healthy businesses for their investment;
- Technical and scientific information; and
- Information on raw material suppliers and buyers.

This situation is exacerbated by the dominance of the oil sector in the overall economy and of large state enterprises in industrial production. Thus, the potential for subcontracting to SMEs by the large automotive, transport, home appliances and oil industries is yet to be realized.

The Technology & Business Services to SMEs

Iran Small Industries Organization (ISIO)

ISIO was Formed In 2003 by Merging Two Previous Organization *IIEC* and *ISIO*. Iran Industrial Estates Corporation (IIEC) was established in 1985 in order to establish industrial estates (parks) & provide the necessary infrastructures and services for industrial investors.

Iran Small Industries Organization (ISIO) was established in 2001 according to Parliament's legislation with the aim of formulating policies and guidelines for small enterprises development and supporting them to enhance their employment rate in industrial sectors.

ISIO's Main Policies

ISIO has some key policies as follows:

1. To enable the business environment for small industries by providing and recommending necessary proposals for policy-makers
2. To promote entrepreneurship and develop human resources
3. Assisting firms in increasing productivity and quality
4. Facilitating the transition to a market economy
5. To Develop information technology and e-commerce in small industries
6. To provide access to financial and capital resources
7. To support start-ups, giving priority to those in undeveloped regions
8. To develop technology, R&D activities and innovation in small industries
9. Constructing/improving regional infrastructure by establishing industrial parks and prefabricated workshops.

Roles of Industrial SMEs on Employment and Economy in Iran:

As below the tables identifie the role of industries, number of their workers and their added values. As it is shown, the small factories which have workers between 1 to 9

have the most important role in employing candidates and economic development. They have more than 50 percent share of industrial economy and employment in Iran. Hence, SMEs have an important role in job creation, economic and Industrial development in Iran. This will be so important if we consider the roles of companies in the field of services and production, which most of them are SMEs companies.

Industrial Development Strategy in Iran and SMEs:

Iran has had various industrial development strategies in different past's years. Before revolution in 1979, Iran did not have a very detailed and systematic strategy for industrial development. Consumer goods, machinery and industrial equipments, and other needs were imported mainly from west thanks to oil production and export. This was the main motive and lever for Iran industrial and economic development. After the Islamic revolution (1979), due to the political crises, for example 8 years war between Iraq and Iran and some limitations on export and import, there was a need for a systematic industrial development strategy, what was called *self sufficiency* of needs. Iranian officials decided to develop the capability for domestic production of a variety of products and services by Iranian firms for about 15 years. This was a strategy already used by some socialistic countries. By the end of war and beginning of the third and forth socio-economic development plan, due to some renovations in political, economy and also WTO policies, Iran's industrial development strategy changed to become more export-oriented.

Nowadays Iranian industrial development strategy again due to some foreign policies is changed and is faced with some limitations on importing and exporting equipments and commodities. However, a clear industrial strategy and technological road mapping is a challenge for Iran's industrial development. This situation makes industries to be inefficient, facing with different problems such as limitation of importing their needs and the difficulty in the flow of knowledge, etc. Under such conditions, due to changes of law and regulation in Iran, the SMEs could be more compatible to the industrial strategy of government of Iran and this makes them uncompetitive compared to other international firms in all around the world

Industries, Industrial Towns, Research & Technology development and SMEs in Iran:

Most of small and medium factories are in industrial cities. Some details of Iranian industrial cities are shown in Table 3. Table 4 also provides some information about the role and importance of Iranian industrial cities. It is shown that the technology Parks are yet to be established, and developed. Technology Parks and centres give different services to some SMEs such as; technical information, research and laboratory tests and other services.

Table 3: Some industrial information about Iran in 2007 [15,16]

	No. of factories	workers 10^3
Small factory (1-9 workers)	16,057	10714
Medium factory (10-50 workers)	12.151	2666
Factory (more than 50 workers)	3906	8038
All the factories	32,114	21428

Table 4: Some information about Iranian industrial cities in 2008[15]

Number of industrial towns	393
Number of industrial company in the industrial cities	20594
Workers	442163
Number of technology cities	2
Number of technology centres in the industrial cities	8
Number of IT centres	3

Conclusions & Recomendation

In spite of huge industries, medium and small business plants and factories have not been able to launch R&D centres or even laboratory to test their products and raw materials for their technology development. They still need to have access to some accredited laboratories or technology centres. Such kind of firms are very important to economy and employment, and establishing of these types of centers would be very effective to industrial development at the national level. Therefore, using standard methods of design and production such as ISO/IEC 17025 will be more useful on technology development in SMEs. Therefore the following recommended are as follow:

- To provide a careful and comprehensive strategy which contributes to long-term policy-design and policy-making
- It is suggested for many industrial towns have a technical services centres and incubators and also accredited laboratory to give more qualified services to SMEs in Iran.
- It is recommended that universities and research centres use standards methods and technology managements systems in their research and laboratory activities. This will raise the confidence of SMEs.
- To create a conductive environment in order to stimulate the development of knowledge-base SMEs
- To provide support in management, engineering and technical areas for tenant SMEs.
- To encourage R&D and innovation in SMEs.
- To promote innovation growth in the development of technology- driven SMEs that are competitive
- To provide first class infrastructure and services for SMEs.
- Engaging Iranian embassies across the globe in this issues.

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