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Misleading Leadership Technology Development in Republic Islamic of Iran

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Abstract:

Progress of technology (PT) is a long-term investment in the future, serving as the cornerstone for innovation-driven growth and development. PT in developing countries faces of several barriers which are classified in this research as structural (including lack of R&D infrastructures, inappropriate systems and policies, weak leaderships, lack of management freedom) and situational (including inaccurate political and managerial systems, rules, and regulations). This research tries to shade light on the nature of the barriers and look for the ways to overcome. Top leaderships in these countries instead dressing a clear long term strategic plan to pursue PT, are eager of power and pursue their own personal ambitions. Most of them just ignore and don't focus on PT; even if they want to do so, because of weak leadership, lack of knowledge and experience they don't have any clue how to dress the issue. They most often are misleading PT.

Keywords:

Leadership, Progress of Technology, R&D Infrastructure, Industrial Policies, Management Freedom, Structural, Situational Barriers

1. Introduction

Progress of Technology (PT) is a legacy of human being. The type and the speed of progress of technology depend on many factors some of them remain unknown which scholars try to identify.

Research and development in global village is a primary step towards PT. It is a long-term investment in the future, serving as the cornerstone for innovation-driven growth. While there is a significant immediate economic impact from R&D activities (estimated to reach a total impact of 8.7 million jobs from the full effects of R&D spending across the U.S. economy in 2014) [5], the big pay-off from investments in R&D are longer-term sustained economic gains through strengthened global competitiveness and even creation of entire new industries. R&D investments are the foundation for generating new knowledge through basic research and ultimately for generating products and services through applied research and commercialization.

PT in developing countries is facing several barriers [5] that are classified in this research structural such as lack of R&D infrastructures, inappropriate systems and policies, weak leaderships, lack of management freedom; and situational such as inaccurate political system, inappropriate managerial systems, rules, and regulations. Based on each country's environment lack of some or all of them limit the effort of PT in that country. That means leadership has undeniable primordial impact on PT. Looking back into the industrialization history shows that every developing country needs at least three primordial elements to proceed to PT which includes: -basic Infrastructure, -appropriate environment and atmosphere, and excellent human capabilities.

In order to shed light on the main barriers of progress of technology in developing countries, this research focus on a comparative study in South Korea, Iran, Malaysia, and few developing countries as the sources of our analysis.

2. Main Concept

By definition, research outcome which leads to every single change/new definition of product, service, process or procedure means PT. Progress of technology does not happen without effort and has no limit, edges or specific direction. It can occur in any direction and area. Society needs some infrastructures, a specific environment, appropriate tools and techniques as preconditions to stimulate PT in a specific area. PT is based on R&D which means investigation into new or improves product & services: in business and industry, the efforts of investigating improve processes, products, or services and of developing new ones (Microsoft Encarta, 2009). Research seeks to make basic discoveries and uncover new principles or facts so far unknown or unrecognized. Industry is aware that tomorrow‘s profit depends to a large extent on today‘s research and the fact that money invested now in R&D probably will not generate income for several years to come [4]. Beside the shift towards a more knowledge-based economy is inevitable for PT in developing countries, but it requires creating a national innovation system on science and technology that would not only merely transfer ready-made technologies, but also engage in re-invention, developing new technologies and diffusing those economy-wide [8].

Three elements as mentioned above are crucial to build a common ground for PT: Infrastructures (including high quality educational and research base organizations, R&D labs, tools and techniques); Leaderships awareness and resources (including HR, finance, technology, managerial freedom, and networking); and appropriate rules, regulations, procedures, policies, and systems.

By a comparative PT analysis in development countries such as South Korea, Iran, and Malaysia the focus is to shed light on main factors and barriers of PT and its impact.

3. Factors facilitating ground for PT

R&D infrastructures, right deregulations/deregulations (appropriate regulations), political system upon democracy, appropriate industrial policy, managerial freedom, awareness leadership and visionary supportive leadership, leadership of change agents, are the most important factors that facilitate progress of technology in developing countries in two ways of structural and situational:

R&D infrastructure is precondition of PT which includes Universities to provide human resource capabilities who initiate ideation, labs and manufactures to provide ground for testing and processing ideas.

Right (appropriate) regulations as a warranty involves entrepreneurs and innovators in PT in the other hand define the edge of conformity to lead them. Alongside the appropriate regulations governments focus to define incentives needed to involve entrepreneurs in creation and innovations activities.

Political system is the most influential factor in PT that creates the game in which every major plyer in PT can find its own role. Democracy initiates the rule of laws which encourage freedom of talents upon competition and competitive advantage toward innovation and creation.

Appropriate industrial policy (AIP) is a leverage leading production and industrial activities toward state targets in its long-term strategy, following country strings and weaknesses. That means upon country's challenges and needs an aggregate of policies needed to prompt the prioritized industrial activities and discourage none prioritized industrial activities.

Management Freedom is the basic condition to PT. A balance between authority and accountability guaranty best use of talents. That means management most has full authority and freedom how to use its resources with respect to rules and regulation in order to be accountable to respond to shareholder's expectations. Any interference in managerial duty deviate the decisions and create disaster.

Visionary and Awareness Leadership has undeniable impact on PT. Leadership through its vision and awareness defines the future pathway and perspective of PT in a country to lead everybody fitting their activities in this concept. Controlling leadership versus visionary leadership involves on upcoming daily evens as executive management which struggles management. Visionary leadership is always supportive and as leadership of change agents not only promotes the changes for better future continuously, but also structuralize it's believe in changes as key point of competitive advantage.

4. Comparative Impacts of Infrastructure Factors (Barriers to PT)

Proceeding necessary infrastructures that include educational and research base facilities to nurture capable human resources; R&D labs for endeavor in apply researches, innovation and creation of new ideas; and some tools, technic, and manufactories to be able test, prototype, develop, and commercialize new ideas is the first step toward PT in a developing country. Among developing countries few of them are able to provide some infrastructures; many of them despite huge effort still trying to have some infrastructures; and many of them just don't have any. South Korea, Malesia, and Iran have a relatively well-developed science and technology infrastructure among developing countries [16]. Iran has well-developed private & public universities, research centers, research labs, and other educational laboratories and institutions that provide high quality Human resources in every single area of expertise might this country needs or will be needed (about 1.5 million students register annually). Universities such as Sharif, Tehran, Amir Kabir, Science &Industry, Shiraz, and Isfahan are among the top ten universities in Middle East and the top 400 universities in the word [14]. The number of basic knowledge research institutes has increased to more than sixty in 2015 which focus mostly on applied

research and prototype. Despite its lack of connection with universities and research centres Iran has good enough manufactories and industries which provide enormous grand for researchers and applied theories.

In Iran and South Korea transition from light and labor intensive industries to heavy and chemical industries, have taken place under government policies. In Iran, this was mostly due to the government investments in metals, machinery, and petrochemical industries. Long-term economic growth is linked to research intensity [5]. Almost %85 of Iran's industries or production activities belongs to government or governmental organizations and most of them just don't have R&D department. That explain the reason innovation and competition on market based orientation had no impact. Diversity, technological sophistication and scale of heavy and petrochemical industries in Korea are much higher than that of Iran [25].

High-tech and knowledge based industries in Korea and Malaysia, initiated earlier than Iran and was more successful; Iran has never paid due attention to the economies of scale and has never established official connections with the big businesses, universities, and research organizations. Iranian economy in the pre-revolution period (1960-1977) performed better than Korea and Malaysia. However, following the Iranian revolution and during Iran-Iraq war period (1978-1988), Iranian economy experienced a major setback. Although in the period 1989-2011 the average growth rate of Koran economy decreased due to the financial crises in 1997 and 2008 and narrowing down the technological gap between Korea and major industrial powers; however, in this period the growth rate of Iranian economy was less than Korea (Table 1).

Table 1. *Average Annual Growth Rate of GDP and Manufacturing in Iran and Korea (1960-2011).*

	Years	**1960-1977**	**1978-1988**	**1989-2011**	**1960-2011**
GDP	Iran	9.2	-2.2	4.9	4.8
	Korea	8.3	7.8	5.4	6.9
	years	**1960-1977**	**1978-1988**	**1989-2010**	**1960-2010**
manufacturing	Iran	13.3	2	8.4	8.7
	Korea	18	12.5	7.3	12.1

1. Central Bank of Islamic Republic of Iran, National Accounts (1960- 2011)

Note: Annual growth rate of Iran in the year 2011 equals to the average growth rate of the first 9 months of the same year.

2. www.worldbank.org/data

5. Structural Changes in the Economy and Manufacturing

The expansion of Korean and Malaysian industrial sector was impressive and came to dominate the economy (Table 2). Although the Iranian economy has experienced similar structural transformation, but there are major differences between Iran and Korea.

In Korea, the industrial sector has also become more capital and technology intensive over time. The dynamic industrialization in South Korea that began with light consumer goods after the Korean War quickly advanced into heavy, chemical, (HCIs) and then into high-tech industries. The industrial scene is now marked by plants requiring relatively high skills and technology, such as the manufacture of electrical machinery, electronic appliances, electronics, chemicals, transport equipment, ships and high-tech products. Malaysian industry began capital and

technology intensive after 1978 when Malaysia internalised the PT in microprocessor and extended digital technology to all industry. Manufacturing sector in Iran also began with consumption goods, then chemical, machinery, transport equipment increased as it did in Korea, and development of high-tech unlike Korea and Malaya started late.

Table 2. *The expansion of Korean and Malaysian industrial sector (1960-2011).*

		Iran		**Korea**		
	1960	1977	2009	1960	1977	2009
Agriculture, Forestry and Fishing	17.3	7	12.9	36.8	24.2	2.6
Oil, Gas extraction and Mining	34	30.7	9.6	2.1	1.5	0.2
Manufacturing	4.2	6.8	20.1	13.8	23.9	30.3
Power, Water and Gas	0.1	0.3	1.2	4.1	1.4	2
Construction	2.7	5.7	5.1		5.3	6.3
Services	41.7	49.5	51.2	43.2	43.7	58.5
Total	100	100	100	100	100	100

1. Central Bank of Islamic Republic of Iran, National Accounts (1960- 2011)
2. The Bank of Korea, Economic Statistics System.

Table 3. *Composition of Manufacturing Value added In Iran and Korea (1960. 1977 and 2009).*

		Iran		**Korea**		
	1975	1990	2008	1975	1990	2008
Foods and Beverages	20.7	12.2	8	17.8	10.7	6.1
Textiles and clothing	33.5	20	3.1	22.6	13.8	4
Chemicals	11.3	8	17.8	4	9.2	8.7
Machinery and transport equipment	19.3	15.4	20.2	14.2	30.2	46.6
Other	15.2	44.5	50.9	41.4	36.1	34.6
Total	100	100	100	100	100	100

Value added as % of GDP, 2001

Asian investment in R&D has shifted from cost to competences and capturing market opportunity [15]. Iran's industrial sector lacks effective competition. Competition is the key driving force for innovation and technological change [16]. Business associations, business support organizations and consumer groups are very weak and play almost no role in the system. Thus, user-producer linkages are weak and innovation activities in

Iran is not demand-driven [16].

Table 4. *Sectoral contributions to GDP - comparison of Iran.*

	The Republic of Korea and Malaysia			Manufacturing exports as % total merchandise exports, 2000	Foreign direct investment, USD in millions, 2003
	Agriculture	Industry	Services		
Iran	19	26	54	7	120
Korea	4	41	54	91	3,752
Malaysia	8	50	42	80	2,474

Source: World Development Report 2003 (World Bank), World Investment Report 2004 (UNCTAD)

6. National System of Innovation

Countries that have successfully transformed their economy to compete in technology and knowledge-intensive sectors have done so by creating and strengthening their national system of innovation (NSI). An innovation system is a network of economic agents whose activities and interactions bring new products, new processes and new forms of organization into economic use. The key agents in this network include enterprises, the universities and research institutes, the government, and other support institutions such as industry associations, consumer groups, business support organizations and financial institutions [16]. The interaction and harmony between these elements are more primordial than having them with no impact on each other or partial interaction between some of them, which in most developing countries is absent.

The nature of this interaction in Iran ranges from prioritization of research areas by the relevant ministries to funding of specific research projects. The research institutes/universities, in turn, monitor technological developments and provide feedback to the ministries to facilitate decisions relating to research priorities. The Technology Cooperation Office (TCO) under the Presidency is also an important actor in the innovation system and has strong links with the research institutes, established mainly through funding of research projects that can be commercialized by Iranian enterprises. The link between research institutes/universities and few large enterprises are also strong. Many large enterprises in Iran do not have in-house R&D capacity and they tend to rely on research institutes for product development and process innovation. Links have also been observed between high-tech SMEs on the one hand and research institutes/universities and government ministries on the other.

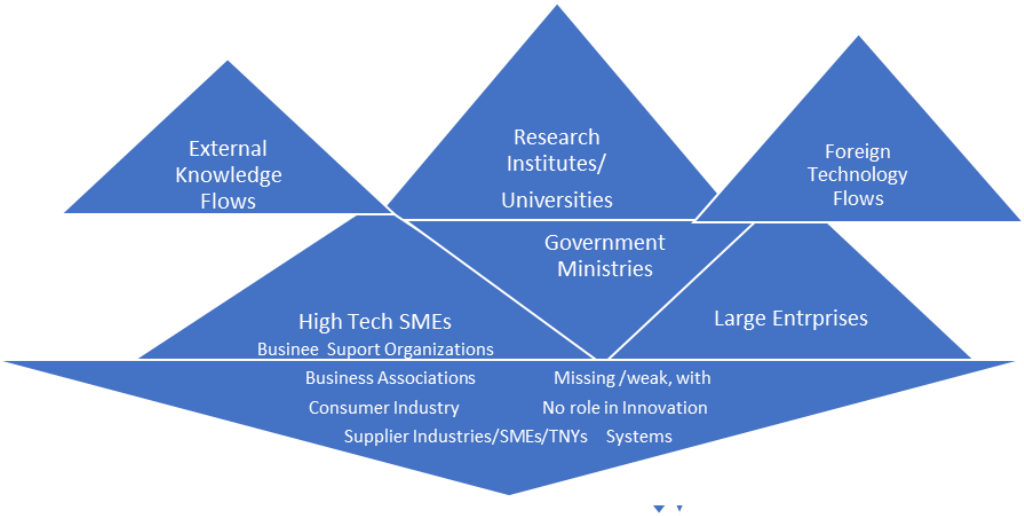

Figure 1. *National System of Innovation in Iran.*

Although Iran is richly endowed with both natural resources and well educated scientists and engineers, this potential advantage has not yet been capitalized for achieving the transition from an oil-driven to innovation-driven growth due to the weaknesses in the national innovation system. All innovation activities are concentrated in the research institutes and universities [16].

Established in 1980, IROST's mission is to support, financially and intellectually, inventors, innovators and researchers mainly in the private sector. Under such conditions, it is unlikely that an integrated science and technology policy can be

completed in the short term and even less likely that such a policy will be centered on creating a culture of innovation within the Iranian society and economy or provide the stimulus and support needed to strengthen the national system of innovation in Iran and the innovation dynamic within it. Governmental bodies and research institutions in Iran work in parallel rather than to collaborate. What is a problem, however, is the lack of cross fertilization and information flows across projects and ministries/institutions in which they most located within appropriate body policy [16].

There is a need to establish a funding mechanism that gives incentives for the universities to conduct research in areas that underpins industrial development. A flexible, program-oriented system that includes strategic research in the universities should also be complemented with the development of effective arrangements for science-industry relations like cofounding of programs, student projects, consortia development, Ph.D. programs and exchange programs [16].

Traditionally, IPRs were categorized as: i) Industrial Property which is a Patent granted to an invention that has an industrial application; and ii) Artistic and Literary Works, which are granted Copyrights to confer moral and economic rights to the creators of such work. Subsequently, several other IPRs, such as trademarks, geographical indications, industrial designs, etc., have come into existence. The range of inventions for which these IPRs granted has also expanded (e. g. patents grants for biological substances, copyrights for software, etc.). Under the WTO's TRIPS Agreements, even Trade Secrets are conferred a right to be protected.

The IPRs regime in a country has significant implications for innovation and learning. For instance, patents encourage inventions by granting exclusive commercial rights to the inventor and preventing others from imitating the invention. However, at the same time, a patent grant is subject to publication of the technical details of the invention. Such publication promotes subsequent waves of innovations. Similarly, trademarks protect the firms that have built up a reputation for quality of their products from cheap imitations. Such protection encourages firms to produce superior quality. Iran has a fairly well-established intellectual property system among developing countries. The first patent in Iran was granted as early as in 1925. The existing law on patents was enacted in 1931. In 1957, executive regulations were added and modifications made. A year later Iran became a Member State of the Paris Convention (on patents). In 1978, the Paris Convention text was revised. But, Iran joined the revised convention only in 1998 [16]. During war with Iraq and economic sanctions almost all those intellectual property and patent commitment stopped with no effect.

7. Academia's Important Role

As in the US, an important portion of research activity will be conducted by academia. European universities place second only to U.S. universities in the latest Times Higher Education World Rankings, with about 71 European universities ranked in the Top 400, compared to 77 U.S. universities. THE rankings are based on 13 performance indicators in areas involving teaching, research, knowledge transfer and global outlook. The U.K. had the largest number of European universities in the top 400 list with 29 [5].

Table 5. *Forecast Gross Expenditures on R&D.*

	2012			2013			2014		
	GDP	**R&D**	**GERD***	**GDP**	**R&D**	**GERD**	**GDP**	**R&D**	**GERD**
	PPP Bil,$	% GDP	PPP Bil, $	PPP Bil,$	% GDP	PPP Bil, $	PPP Bil,$	% GDP	PPP Bil, $
United States	15,940	2.8%	447	16,195	2.8%	450	16,616	2.8%	465
China	12,610	1.8%	232	13,568	1.9%	258	14,559	2.0%	284
Japan	4,704	3.4%	160	4,798	3.4%	163	4,856	3.4%	165
Germany	3,250	2.8%	92	3,266	2.8%	92	3,312	2.9%	92
South Korea	1,640	3.6%	59	1,686	3.6%	61	1,748	3.6%	63
Iran	1,016	0.8%	8	1,001	0.8%	8	1,014	0.8%	9
Subtotal (Top 40)	73,362	2.0%	1,478	75,338	2.0%	1,518	77,896	2.0%	1,576
Rest of World	10,071	0.4%	39	10,413	0.4%	40	10,837	0.4%	42
Global Spending	83,434	1.8%	1,517	85,751	1.8%	1,558	8,733	1.8%	1,618

** GERD: Gross Expenditures on Research and Development, PPP: Purchasing Power Parity (used to normalize)*

Source: Battelle, R&D Magazine, International Monetary Fund, World Bank, CIA Fact Book

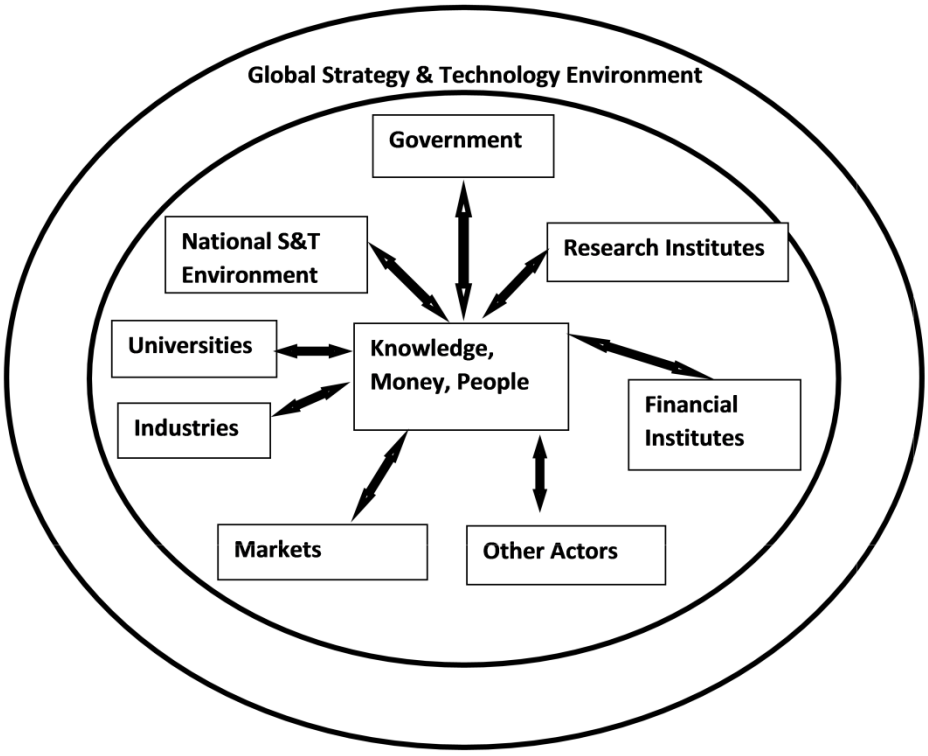

Figure 2. *National Innovation System: Source [25].*

China, South Korea, Japan and Taiwan, in addition to their regional proximity, all have strong R&D programs that support development of science and technology (S&T) in the public and private sectors. Like China, Korea has established aggressive five-year plans for S&T. The objectives involve national competitiveness in

innovation-intensive industries in which each country also has a strong manufacturing stake. (Global R&D funding Forecast, 2013, p18)

Places that have built up strong industries, with all the supporting infrastructure and suppliers, create virtuous circles as the growth of an industry attracts talent that in turns attracts more industry. Numerous examples of this dynamic exist across Asia, such as in Thailand which is today the world's tenth-largest auto exporter, or Penang in Malaysia which has developed a deep pool of engineers with expertise in electronics and manufacturing [3].

8. Appropriate Rules, Regulations, Procedures, Policies, and Systems

The reliance only on markets does not pre-empt a proactive role for the government and nor promises any innovation, creation and technological progress. Having some sporadic rules, regulations, policies, fragmented systems without any long-term directions, appropriate institutions and specific guidelines lead to nowhere. The necessity to make PT works efficiently in developing countries is often weak or absent. Government interventions are needed to improve on market outcomes. In other hand, some industrialization policies have not worked well in the past. In fact, the nature of the political regime, determines the quality of bureaucracy, and this one in turn affects the quality of market institutions and government policies toward PT [25]. Iran like every other developing country has some systems, rules, regulations, policies and procedures towards PT, but none of them are appropriate and in most case, they are contradicting each other. Because they are not following same direction and in addition lack of objectives toward a long-term PT strategy, plan, and budget makes all of them very weak. For example, in one hand IROST's mission is to support, financially and intellectually, inventors, innovators. In other hand taxation system, not only doesn't support, but also give them penalty. In absence of market and innovation orientation none of them works like in other countries such as South Korea.

In Iran like Korea, an authoritarian and centralized government was set up after the 1953 coup d'état, whose main objective was modernization of Iran through rapid industrialization. After the Iranian Revolution, the course of events and policies changed dramatically. Modernization was interpreted as westernization. Private entrepreneurship was identified as dependent bourgeoisie to western block. The close political and economic ties with west collapsed then, private enterprises were mostly replaced by state owned enterprises. With respect to the meritocracy in public sector Korea in the period 1960-2012 had highly qualified technocrats [25].

While Korea established an efficacy Plan and Budget organization which initiates government strategies since 1952 and in the fifth plan main directions were privatization and market orientation. But Iranian Plan and Budget organization (was abandoned for ten years 1948-1955) transformed to a pseudo organization and it never succeeded in coordinating the government monetary, fiscal and trade policies.

In Korea, Development Bank, Medium Industry Bank, and Export-Import Bank, owned by the state and had a prominent role in financing manufacturing sector of the country. Most loans were extended to promote the designated industries and sometimes particular enterprises that were considered by the government to be critical to the nation's economic development.

After the Revolution, financial repression policies were adopted by the Central Bank of Iran and credit rationing became prevalent. But manufacturing sector was not

favored by banks for credit distribution. The free entry to the manufacturing sector and unsupervised credits were two other problems facing private sectors [25]. Central bank instead playing a prominent role by promoting financially manufacturing sector specially enterprises that were considered to be critical to the nation toward advance technology, through financial repression it has restricken whole economy.

In Korea government, intensified incentives to exporters. The export credit subsidy was the most significant incentive scheme (Ibid). Contrary to Korea, Iran had an easy access to hard currencies by exporting crude oil. So, import substitution policy was adopted in the country for a long time without paying due attention to the export promotion. In Iran, Government having access to an easy source of revenue did not fill such an urgent need. In Korea, the import substitution policy was simultaneously followed with export allocation policy. Korean policymakers have regarded assimilation of advanced technology by domestic firms as a vital condition for effective industrial upgrading. Later it has restricted in priority industries. Even technological licensing, was subject to heavy restrictions. For example, the 1988 version of the Law for Importation of foreign capital clearly states that technological licensing is banned in industries where local technological capability is deemed to be promising [21].

Both before and after the Iranian Islamic Revolution, unrestricted and unselective attraction of FDI has not helped Iranian manufacturing sector very much in technology transfers or in opening foreign markets. Governments around the world, and particularly in Asia, recognize the importance of investing in the building blocks of innovation-based economies. All countries seek economic growth, often amplified by the need for job creation to match rising populations: energy, food and water demands, strategies vary. In the U.S., the government tends to seed innovation with investment in basic research and some tax and policy incentives, but the free market decides which technology is deployed at large scale [5].

Strengthening measures to support transparency and accountability – Knowledge and information flows provide the signals for both adaptive policymaking and technological innovation [16]. To enhance such flows, within the shortest possible time, the government should set up integrated and harmonized economic, politic, financial, fiscal, technological, educational, and managerial systems and policies for monitoring and evaluating policies and programs strengthen the collection of economic data and information on science and technology inputs and outputs. No initiation such kind has been performed from Iranian stat versus South Korea and Malesia stats since 1979.

Iran has a fairly well developed pharmaceutical industry compared to others in the developing world. However, only a few pharmaceutical companies have R&D capabilities to develop new products and processes. A clear understanding of the integrated nature of innovation systems is still lacking within policy-making circles [16]. A fact is that renders the process, dependent on personal and collective judgements in the council. In other words, targets are not transparent and there is a lack of performance criteria in determining what should be achieved with the help of R&D. The research activities themselves need to be more interactive and less linear, considering that current and future R&D needs should be based on combinations of skills and knowledge bases. A related problem is the overly focus on engineering activities as part of the R&D, and an issue to be confronted in the future is the extent

to which government R&D units should continue to conduct activities that could or even should be encouraged in the private sector [16].

In total absence of conventional management freedom and private sectors the analysis so far points to the important role of government policies without which an assessment of the innovation system will make little sense. The Iranian management system is defined by the broader political-economic system, and changes in the innovation system as such without some broader changes in the surrounding political-economic system may have little effect. Hence, a critical weakness in the system, like lack of transparency, is very much a political issue, but has significant impacts on the performance of the innovation system [16]. The growing attention in many industrialized countries to the need to build bridges between knowledge producers and users has resulted in a wide range of policy initiatives to spur public-private partnerships and science-industry relations. In recent years, international strategic partnerships have become popular among enterprises and research institutions as a means of acquiring new knowledge, technologies and learning. Some of the Iranian research institutes already have such partnerships with some foreign research institutes on a smaller scale but not with each other or with public sector. The key role of the government is missing to formulate policies, fiscal measures and related organizations that promote the level playing field and an outward-looking trade strategy]16].

In the light of the country's resources and industrial structure, it is generally agreed that the Korean government and business should focus on advanced technology industries, parts and materials sector, and knowledge-based service industries as the sources of future growth and the same in Malaysia. These new growth industries are not only expected to play the leading role in forging the future of the Korean and Malaysian economy, but also influence the development of their existing industries. As for science and technology, Korea has reached the level where it can be at the forefront of global efforts in making scientific and technological breakthroughs [12]. The MSRT's functions in goal-setting, planning, policy-making and finance differ considerably across the education, research and technology sectors [10].

In Iran after the revolution (1988-2004) in some projects such as Isfahan Iron and Steel and Arak aluminum project, selection of inappropriate technologies, and small scales, has increased the cost of production. Iranian engineers and technicians did not acquire necessary capabilities to implement similar projects after the completion of projects in their hand.

Table 6. *Korea's Transition toward a Knowledge Economy.*

Development Stage	1960s	1970s	1980s	1990s	2000s
	Factor-Driven	Investment-Driven		Innovation-Driven	
Industry Policy	Support Export Development	Promote Heavy and Chemical Industries	Shift From Industry targeting to R&D	Provide Infrastructures and R&D Support	Promote New Engines of Growth and Upgrade R&D

S&T Policy	-Most/KIST -S&T Promotion Act -Five-Year Economic Plan Including S&T	-Government Research Institution -Technical and Vocation Schools -R&D Promotion ACT -Daedeock Science Town	-National R&D plan -Private Sector in R&D	-information -E-Government -GRI Restructuring -U-I-G Lingages	-Universities Leading Role -Efficient NTS -RID and Innovation Cluster

Development of high- tech industries in Iran started very late in 2000s by setting up government companies in nanotechnology, micro-electronics, bio-technology, aerospace, and atomic energy (for peaceful purposes). But commercialization of R&D in these areas has been delayed for various reasons.

The World Bank indicators show the large gap between Iran and Korea in knowledge based economy infrastructures (Table 7)

Table 7. *Knowledge Economy Indexes for Korea and Iran, 2012.*

COUNTRY	**IRAN**	**KORA**
RANK (2012)	94	29
CHANGE IN RANK	1	-5
KI	4.97	8.65
INNOVATION	5.02	8.8
EDUCATION	4.61	9.09
ICT	5.28	8.05
ECONOMIC INCENTIVE REGIME	0.73	5.93
KEI	3.91	7.97

Source: www.worldbank.org/kam

Korean policymakers have regarded competition as a mean to achieve efficiency rather than as an end in which states that collusive behavior should be allowed, and even encouraged, in promising industries that need to increase R&D, improve quality, attain efficient production scale in declining industries that need to scale down their capacities [26]. In Iran scale of economies was limited to the size of domestic market. In the last twenty years, certain business groups are formed as semi-state owned agglomerations which have monopolistic power in the market of certain products in which bribery was obvious. These groups have benefited from the government privatization policy in this period [25]. In absence of right leadership, knowledge based economic, management freedom, market orientation, market competition, and very weak infrastructures government has no other choice than forming some business groups as semi-state owned agglomerations which lead to monopolistic power and bribery under privatisation title.

In a question, why South Korea has been successful in economic growth and industrial transformation instead Iran has failed? Scholars believe there is a different political understanding. The nature of political regimes and economic institutions, trade and industrial policies in the two countries are different. In the period 1960-1977, political regimes in these counties were characterized by authoritarian and developmental states; During the Islamic Revolution and Iran-Iraq War (1978-1988), economic institutions were disrupted in Iran. Private ownership was undermined; foreign investments were nationalized, diplomatic relation with industrial nations

froze, economic planning abandoned, and government interventions in the economy with the aim of inflation control and administrative allocation of resources for the war increased. Iranian economy after a short period of high growth rates, encountered a long-lasting stagflation. The new round of economic sanctions against the country in 2012 and 2015 aggravated the situation further. Today, the diversity, technological sophistication and scale of heavy and petrochemical industries in Korea are much higher than that of Iran. Transition to high-tech and knowledge based industries in Korea, initiated earlier than in Iran, and government assistance in promoting R&D, training highly skilled manpower and providing subsidies have had crucial role in the development of high-tech industries, but in Iran, however, high-tech industries are yet to born. Iranian government has created state-owned R&D based companies in high-tech industries, but so far, commercialization of their innovations has not been realized in a large scale. Iranian government unlike Korean government, has never exerted a serious restriction on the entry and exit to any industry, and has never paid due attention to the economies of scale. One of the characteristics of Iranian economy after the Islamic Revolution is the emergence of new economic agglomerates owned by semi-state holding companies, which have close ties with political power centers. Iran is the 23th among 40th top expenditures countries in R&D.

8.1. Inappropriate Management system

Since 1979, Shah's managerial system is being dismantled; no appropriate managerial system has been replaced. By necessity, every state institute and organization sporadically designs its own system and tries to link to each other without any specific and general orientations, guidelines, and strategy which didn't and will not work. In other world after 1979 an industrial, economic, political, scientific, educational, fiscal anarchic systems is been replaced the previous one and lead country to chaos specially in absence management freedom and very weak and wrong leadership, by all means.

Whole management system in Iran regardless of ministry title or type is running by clergies or their relatives and almost all are related to each other from one family. So, manager must follow order from top to down from leader and his entourage. In several cases, top leadership intervenes in even nonsense issues such as students' behaviour or educational references. If management doesn't follow them, management is face of persecution and judiciary process. The typical example of this is the former Tehran city mayor's Mr. Karbuschi in 1997 who has been put in jail for five years. For that reason, the corruption and fraud is everywhere and almost in all state institutes' including judiciary and justice department. Consequently, no manager has power and voluntary to execute tasks based on s/he knowledge, expertise, and experiences if s/he has any (because nomination is not based on merit rather relationship). All systems are fraud and the person in charge in case of necessity can find the way to bypass all rules, regulations, and policies. As Example president Ahmadinejad dismantled the budget and planning organization in 2005 which was crucial for development of country, from 2009 the parliament and new president three times tempted to pass new law to establish it again. Each time Guardian Council had rejected, because the Guardian Council didn't want to be accountable and any organization supervise their budget.

The management system in this country is very complex unlike South Korea and Malaysia. The main task of Guardian Council is to supervise every law passes by parliament and approve candidacy of every MP and member of expert council which

will supervise the leader's duty and choosing future leader. But half of the Guardian Council will be selected by leader!!

The innovation and creation spark relies on motivation, taxation, subsidisation, and financial incentives which should be dress by state policies. When the state doesn't have appropriate systems and bodies to define it, how can be expected the state come up with the appropriate policies and activate each of these related incentives and conduct them alongside and towards of its long-term strategy?

8.2. Inappropriate Political system

Political system in developing countries is unstable. All studies show from Henry Mintzberg [6] to Joel Mokyr [7] for a sustainable progress of technology (PT) state needs a clear and persuasive long term economics and industrial strategy to conduct and lead PT toward the main goals and objectives of its strategy. When politic is in control of handful people who are changing continuously in a short period and don't have any knowledge, expertise, and experiences in management, they would not be able to define a trend of PT and even they might not be able to create appropriate and stable political system to pursue, because of authority changing in a short period.

South Korea after separation from north in 1949, General Park established third republic in 1963, restored some political freedoms, began major industrial development setup the first industrial and economic strategy to launch free industrial zones aimed bring foreign investments and technologies and South Korea succeed to start up PT in 1980s three decades later. During shah reign Iran had political stability and by a French company called CETIRAN's help in 1971 he could develop six industrial planes and he claimed that Iran would be able in 1980s reach the big industrial civilisation among the first twenty industrial countries. At that time, South Korea was way behind Iran. During last thirty five years, South Korea on reason of political stability could perform a fast PT than any other countries and way beyond of expectation, but Iran because of political instability not only lost the direction of PT and also wasted whole infrastructures that had been invested.

Mahathir Mohammad Malaysian prime minster by his 2020 industrial strategy in 1990 brought a real political stability to this country for next 25 years [11].The political stability abled Malaysia to reach its aims and objectives of PT by bring in the huge amount of foreign investments and technologies.

9. Recommendations

Faster PT relies on free flow of information. We confirmed that the interrelationship between open innovation and output of company tends to be higher if there is a free flow of information and knowledge exchange inside the countries and companies which stimulates PT. In other words, to precede PT and facilitate the open innovation externally outside the company, company and country should be allowed the free exchange of information and knowledge inside the company first for higher creativity. The leadership of country and CEO of the company should first promote the open innovation inside the country/company. Secondly, we confirmed that there are some institutions/open innovation channels which exert a more direct effect on enhancement of company output while there are other institutions/channels which don't exert as much. So, it is crucial for both governments and companies to search and utilize the most appropriate channel at the first

10. Conclusions

Developing countries for proceeding progress of technology in competitive environment and smart economic age need appropriate R&D infrastructure, Rules and regulation, systems and policies in on hand and having convenient political system, managerial freedom, strong management and leadership in other hand.

This study explored the some inner dynamics of three entities in Iran, Korea and Malaysia – Institutions, some R&D achievements, R&D business opportunity, and their interactions. From this exploratory paper it can be concluded that interrelationship between the different institutions and company output can be very different by cluster. So, there should be a customized and dynamic political platform for facilitating the innovation by cluster.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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