

FDI, EFFICIENT TECHNOLOGY TRANSFER STRATEGY IN DEVELOPING COUNTRIES (IRAN CASE STUDY)

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ABSTRACT

Today, technology has become as one of the main pillars of modern and developed societies and is one of the most important factors of economic growth and development. In this regard, the best course of acquiring technology has become one of the most important problems for economic officials. All countries, especially developing countries like Iran, will not be able to provide all their technological needs alone. The absolute reliance on R&D activities is not remedial for developing countries, due to the technological gap they have with the developed countries. As a result of further development of technology, the need of international technology transfer to developing countries is more crucial than ever. This article, considering foreign direct investment (FDI) as the best method of technology transfer in developing countries like Iran, concludes that the situation of this investment in Iran has been improved, but there are still obstacles in the economic framework of Iran and foreign investment infrastructures and appropriate solutions for improvement of the FDI strategy can be adopted.

Keywords: Technology transfer, Technology development, FDI, Developing countries

INTRODUCTION

The importance of technology is clear as one of the most important factors for economic development in modern societies. There are various definitions and interpretations of the concept of technology. As defined by the United Nations, technology is a collection of information, skills, methods and necessary tools to make required products and their applications or provide the most useful and needed services. In other words, Abbaspour (1987) claims that "technology is a set of knowledge and skills to produce goods and services which are results of human thought and understanding and the combination of the laws in nature".

As Efstathiades et al. (2000) defines that "presence of technology represents one of the most important factors in the development of a country. Implementation of technology has a great impact on its performance and hence its business efficiency". Technology Implementation in developing countries is different with developed countries. R&D activities, in developed countries like United States and Japan, considered the main source of industrial growth and development of the technology and have special place. Compared with developed countries, technological system of developing countries has different structure. Because of the technological gap these countries have with developed countries, R&D activities alone will not be alternative for their technology develop problems. Developing countries can

benefit from technology transfer policies to create new technology. Technology transfer in developing countries is an important factor in navigation of these countries to the developing and has great importance for development planners in developing countries. For various reasons, including lack of the investment climate saturation or cheap labor, advanced and developed countries want to work together and invest in developing countries.

Many developing countries are apparently still trying to establish the most appropriate procedures for technology transfer policies and also indispensable for successful industrial development. Since the effectiveness of technology imports related to technology transfer methods, so appropriate strategic development for the effective and efficient transfer of foreign technology is very important. One of the most important methods of technology transfer is FDI (foreign direct investment), which foreign countries invest in the host country directly. Darvish (2005) claims that "foreign investment can be an implement for growth and development and most countries, especially developing countries which have fewer economic opportunities and lower liquidity, are seeking to attract foreign capital in order to their economic plans and economy-industrial grow". As one of the Middle East countries, Iran is looking to achieve the first place in region in its long-term policies of 2025. To achieve this, Iran needs continues and optimized growth in technological and industrial fields and this point, due to the existing R&D weaknesses in developing countries, need to implement effective technology transfer policies. The aim of this paper is to study the effects of FDI as the most important technology transfer methods in Iran and provide solutions to overcome barriers in this field.

LITERATURE REVIEW

Existing theories in the field of FDI and its influencing factors can be divided into two categories. One group, the theories that consider the FDI only as part of investment and economic growth factors, and new theories that in addition to this, knows the FDI as a way to transfer new knowledge and technology.

Borensztein et al. (1998), based on a model of endogenous growth have come to the conclusion that FDI, increases long-term economic growth by affecting the multiplication rate of the industrial world technology to the host country.

Studies in this field can be noted by Tang (2001) on the role of FDI in Chinese enterprises. One of the most important goals of this research is to identify the factors influencing the transfer of foreign technology and foreign direct investment by Chinese enterprises. He emphasized the positive effects of external knowledge flow on the development and growth of the economy.

Groenbech (2001) also has done studies to determine how technology transferred to developing countries through FDI. He knows FDI as the main method of technology transfer to developing countries and of course points out that all countries are not able to take appropriate advantage of this method. In his opinion, international investing organization in spite of their capacity has limited impact on the conduct of FDI to developing or less developed countries.

Nunnenkam (2002) claimed in his study that FDI in developing countries plays a more significant role than developed countries. He also emphasized that developing countries with appropriate infrastructure

can become more attractive as an opportunity for FDI, not only for large and relatively advanced countries, but also for all foreign investors.

Well as Glass and Saggi (2006) have studied the role of FDI on international technology transfer. They described FDI as a complex and multifaceted phenomenon that has priority for developing countries towards R&D and purely national production activities. According to their studies, Multinational enterprises can be a central host to introduce new technologies and they do this through FDI as an efficient method.

THE CONCEPT OF TECHNOLOGY TRANSFER

UNCTAD (1985) claims that “transfer of technology has been defined as the transfer of systematic knowledge for the manufacture of a product, for the application of a process or for the rendering of a service”. Moini (2004) also, defines that “technology transfer is technology conscious shift in the series that has not been previously utilized”. In the modern global society, only developing countries that have the high technical potential to absorb new technologies from developed countries can compete and survive in the growth cycle. Technology transfer is the best option to reduce the technological gap between developed and developing countries. Successful transfer of technology needs the cognition of industry objectives, technology resources, innovation of technology transfer methods and attraction and developing of technology transfer.

Only the technology transfer that has been selected carefully, can improve the technological level of a country. Inappropriate transfer of technology can even lead to the weakening of national technology. Technology transfer is not only the purchase of equipment and technical documentation. The Look to technology transfer should be such that lead to the creation of new technology, in addition to imported technology. Technology transfer success factors can be divided into two groups: internal and external factors. National commitment to the technology development and the creation of infrastructures are the most important internal factors. External factors are mainly includes saturated investment environment in developed countries and the interest of foreign investors in joint collaboration.

Technology transfer is done in two ways, vertical transfer and horizontal transfer. In the vertical transfer R&D activities reach the development and production phase and in the horizontal transfer, technology transmitted from one level of empowerment in a country to that level in another place. Technology transfer method, depending on the type and condition of suppliers and applicants is different. This has led to the creation of different classification for technology transfer methods such as formal and informal methods. Effective transfer of technology to developing countries often has done through formal methods, especially methods such as FDI and joint ventures.

Absorptive capacity and technology transfer

As Gholizadeh et al. (2015) claims, “many countries have used their technological gap with developed countries as an accelerator for improving their absorption capacity”. According to Schilling (2005) “absorptive capacity means learning of the environment which is a type of learning which pays attention to learning of knowledge resources in the environment instead of emphasis on value creation through experience”. The absorptive capacity of technology is more needed than importing technology and

equipment for reduction of the technological gap between developed and developing countries. Increasing the technological capabilities will lead to more efficient utilization of imported technology. This is due to comply with the lack of conformity between the conditions of developing countries and imported technology.

The increase of absorptive capacity and technological capabilities development would be effective factors for successful technology transfer. Several factors like human resources, modification of technology infrastructures, physical capitals and the adaptation of imported technologies to the goals can influence the absorptive capacity of technology. These factors can be improved through technology spillovers in technology transfer, especially through methods like FDI.

FDI, PARTICULAR LOOK TO TECHNOLOGY TRANSFER

As UNCTAD (2003) defined “foreign direct investment (FDI) is an investment involving a long-term relationship and reflecting a lasting interest and control by a resident entity in one economy (foreign direct investor or parent enterprise) in an enterprise resident in an economy other than that of the foreign direct investor”. Attracting FDI is a tool to increase competitiveness, technology and innovation. The new definition proposed by the OECD, has defined investment of more than 10% of a foreign enterprise as FDI. Kojima (2007) also considered FDI as a major mean used for transferring the capital, technology and managerial skills as resources from the mother country to the host country.

Technology transfer with this type of investment usually occurs when one or more multinational enterprise transfer capital and technical, management and marketing skills in a foreign country through its branch in the country. The benefits of FDI include raise of funds, technology, knowledge, capacity management, increase employment and the competitiveness. This type of investment is the most effective and realistic form of foreign investment in the global economy. In this type of investment, foreign investors attend independently or collaboratively in host country to produce and manufacture goods, raw materials extraction and other areas of economic activity.

MNEs are looking to transfer their movable assets like technology and skills through FDI. According to UNCTAD, investment should be directed in such ways that factors affecting technology transfer make most value-added. As well, in effective technology transfer through FDI, internal R&D enterprises make the best use of technology spillover. Also, in FDI flow, human resource development for increasing absorptive capacity of new skills from foreign enterprises can improve technology transfer. Improve of supply chain and development of right infrastructures have direct and positive effect on technology transfer through FDI.

FDI attract the international community attention particularly the developing countries seriously from the early 1980s, and created Continuous competitive. Considering the important role of this type of investment and expansion of globalization, in recent decades all countries have done wide planning and effort to attract this type of investment. Until 2012, developed countries were more successful in both fields of R&D and technology transfer methods than developing countries. According to UNCTAD's annual report, developing countries attracted 52% of FDI and overtook developed countries for the first time in 2012. Also in 2013, these countries repeated the process of growing and attract 54 % of total FDI. In 2013 developing countries attract almost 200 billion dollar more than developed countries.

FDI IN IRAN

History of FDI in Iran

In Iran, FDI started since the mid-1950s, mainly by Russian and English in business, industry and banking. In later years, FDI was doing in the form of three laws, enterprise Registration Law, Commercial Law and the Law of Attraction and Protection of FDI. Despite these changes, the share of Iran in world FDI was minimal. During the years 1962 to 1969 the FDI which entered the country was notable and was mainly in the oil and gas sector. The structure of Iran's FDI has been changed in the years before the revolution and took new trend with a focus on investment in machinery and other means of production in order to technology transfer.

In the early years after the revolution of Iran, the entry of FDI dropped sharply due to some legal barriers. Well, as during the Iran-Iraq war and even years afterwards, attract of FDI did not make effective measures because of the devastation caused by war, lack of resources and low levels of technology in the country. 1993 is a milestone in Iran's FDI because of establishing the law of "Creation of free trade - industrial zones and legal protections for FDI". Despite these developments, the process of attracting FDI was not doing well. According to reports published by the IFS, during 1994 - 2000 the average annual FDI has made was 28 million dollars that this figure is not comparable with the figures of FDI.

- i. In line with reforms in the country's economic structure, Iran's Parliament proposes new law on FDI titled the law of Promotion and Protection Foreign Investment which eventually adopted in 2002. This law replaced the Law of Attraction and Protection of FDI and result improvements in the field of foreign investment, such as follows:
- ii. Expansion of the foreign investor's activity field and allowance of investing in infrastructure related to the needed technologies
- iii. Fast process of admitting application and approval of foreign investment
- iv. Create a single organization called the Foreign Investment Center in the center of Investment, Economic and Technical Assistance of Iran to support the activities of foreign investors on Iran
- v. Further liberalization of foreign exchange mechanisms by investors

Current status of FDI in Iran

Iran is the eighteenth largest economy in the world and is currently trying to join the global economy. This needs requirements as attracting FDI. Fortunately, our country provides required contexts by laws such as the Law of Support and Encouragement of Foreign Investment to attract this kind of investment. Iran's potential to attract and encourage foreign investment were identified as a result of how FDI supportive legislation adopts and increasing the volume of foreign investments.

Iran was forced to attract foreign investments for improving product quality and reduce their prices in order to compete in the global market. According to UNCTAD, in 2012 and 2013 Iran respectively ranked 49th and 59th worldwide in terms of attracting FDI. In the same years also, after India, Iran got second

place of south Asia FDI absorbing country, with respectively 4 billion and 662 million dollars and 3 million and 50 million dollars, and as well as the fourth and second place in the Middle East. Total estimation of FDI in Iran from 1990s until now was about 40 billion and 941 million dollars. The overall situation of Iran's FDI in recent years (2008 - 2013) is described in Table 1.

Table 1 - Foreign Investment in Iran, 2008-2013, Source: UNCTAD annual reports

	2008	2009	2010	2011	2012	2013
FDI attraction in Iran (Millions of dollars)	1980	2983	3649	4277	4662	3050
Iran's FDI abroad (Millions of dollars)	380	356	346	360	430	380

According to UNCTAD, in the five years 2008 - 2013 the growth of foreign investment in Iran has achieved a 142 percent jump, however, this growth in global has the average of 22 percent and Also, none of the countries in the Middle East have been a continuous positive growth rate but facing volatility and sometimes negative trend of foreign investment attraction. Asian countries are the largest foreign investors in Iran. In the list provided by the Central Intelligence Agency of the United States, United Arab Emirates, Singapore, Indonesia and Oman, with investing in more than 190 projects, are the largest foreign investors in Iran during the past years. Although European countries, including Germany, Italy and France and Canada also have investments in Iran.

Foreign investing through FDI method in Iran has empowered the capability of technology transfer. As well, the technology spillover caused by this method has progressively developed supply chain and labor capabilities and even has increased the absorptive capacity of technology.

Examples of technology transfer to Iran through FDI

Various FDI contracts have been implemented to provide the technology promotion of the country. The contract between Alstom of France and Arak Pars Wagon can be noted as a successful example of these investments. Under this contract which was signed in the October 1996, France's Alstom committed to the production of diesel-electric locomotives, spare parts, tools and equipment for Iran's railways, as well as training techniques, maintenance, repair and operation of the rail parts to Iran.

Iran's steel industry is also including the industries that have growth and development affected by the modern transferred technologies. Some European countries have begun to invest in Iran through establishing a large factory producing steel with alloy in the Qeshm free zone. These investments have been made to produce 12 million tons of steel per year. Foreign investments done in steel industry is gradually made the invention of indigenous technology possible by attracting and transferring modern knowledge and technology. PERED¹ is an indigenous technology that invented by Iranian experts used by

¹ Persian Reduction

IMIDRO² organization as an alternative method for American MIDREX method for the direct reduction process of the steel. This project used in the country for the first time and make Iran needless of buying technology for this process.

China's MCC³ has also made investments in projects related to Iran's steel industry and other sectors of mining. Launching sponge iron sector of steel industries using modern technology is the priority of this country.

Advantages of Iran for attracting FDI

Iran has a great advantage for foreign investors economically. The country would be the ideal source for foreign investors due to have huge reserves of natural gas, the diversity of natural resources, large population and abundant cheap labor compared to other industrialized countries and neighboring Central Asia and the Persian Gulf.

In terms of the country's policy framework, Iran approved the law of Support and Encourage Foreign Investment to facilitate the attraction of FDI. The main features and advantages of this law are as follows:

- i. No limitations on the percentage of participation share
- ii. No limitations on the amount of foreign investment
- iii. No limitations on the transfer of profits abroad
- iv. No limitations on the transferable foreign investment
- v. No limitations on the types of acceptable assets
- vi. Facilitate the entry and residence of foreign investors
- vii. Covering non-commercial risks
- viii. Possibility to refer the disputes to international arbitration

Enacted laws, abundant cheap labor and unsaturated markets can have good economic sense for absorbing FDI in Iran. Also the tax system has been developed in such a way that the tax on benefits from MNEs activities are maximized. The geographical position of the country in terms of climate, labor and access to commercial crossings, are encouraging factors of foreign investment too. Laws with optimal performance provide the appropriate environment to achieve economic growth. Experimental studies have shown a strong positive relationship between attracting foreign investment and validity of laws.

Barriers of Iran for attracting FDI

The barriers in attracting foreign direct investment in Iran divided into two internal and external factor categories. External factors include sanctions taken against investment in Iran and put pressure on other

² Iranian Mines and Mining Industries Development and Renovation Organization

³ Metallurgical Corporation of China

countries to implement the sanctions. From the most important of these factors ILSA law (1996) can be pointed out. According to this law, foreign enterprises will be subject to the United States sanctions if they have yearly investments more than 20 million dollars in Iran's fields of oil and gas. This is a threat for investment in Iran, especially for large enterprises.

There are internal factors such as legal and political risks of investments, the orientation of the economy and the lack of adequate physical infrastructure that stands in the way of FDI attraction too. Iran, like other third world countries, also has negative beliefs about foreign investing and investment. This misconception is common in developing countries and is due to those statesmen, which prefer state economy instead of free economy. Mentioned factors are summarized in the sense of investment attraction security and are required in the process of attracting investments.

Strategies to overcome barriers

One of the most effective solutions for attracting FDI is reducing the risk of an investment. FDI depends on capital return and the amount of risk it faces. The amount of risk and its relation to capital return determines how much, in what countries, in what areas and in what parts the investment should be. According to the OECD report, Iran's risk appetite is at a higher level of global mean and fixed in the level 7 of 7 levels. Investors looking for a safe place to make a profit with lower insurance costs. As a result, reducing the risk of investing can increase investment in the country.

Other item that can be effective in attracting FDI is economic liberalization. The economic structure of Iran has high control and protection of the government, which thus resulted a lack of competition, creation of monopolies and attract the majority of investment in machinery. Iran could support its FDI with liberalization of its economic structure. Free economy can lead Iran to a great and continued economic growth. Like other new developed countries, Iran should accept free economic framework to achieve economic growth.

There are legal and physical infrastructure barriers to attract foreign investment, which include a range of obstacles and difficulties. One of the legal barriers in this field is Iran's non-membership in regional and international economic organizations that can be solved by changing the economic structure of the country. Lack of adequate transportation system at all levels of the country is the main physical infrastructure barrier. Investment and cooperation with developed countries can grow and improve the transportation system in the country. Improvement of infrastructures can absolutely increase the absorptive capacity of technology in Iran.

CONCLUSION

This paper has focused on considering FDI as an efficient strategy for technology transfer to developing countries, using the economy of Iran as a case study to show the accuracy of this theory. It was found that in recent years, Iran had significant growth and progress in attracting FDI as a developing country and have optimized its attraction of FDI. However, despite this progress, there are still obstacles in the FDI absorption path that need structural reforms in the economy framework, especially in terms of FDI support to eliminate. Lack of foreign investors' reliability and legal restrictions are also the barriers of attracting FDI in Iran. It was found that, in general, very little preparation took place to optimize the

foreign investment infrastructures and the government should develop an accurate and organized plan to prioritize investments, and absorption and localization of transferred technology through these investments.

Technology level between developed countries and developing countries like Iran has a tangible distance, which made technology transfer undeniable. Iran can learn from the history of the development path of developing countries, particularly in the East Asia, which strengthening the foundation of technology through technology transfer from developed countries can be seen. FDI, especially in developing countries like Iran, can act as a useful tool in financing, technology transfer and access to the modern technology and empowerment the infrastructures of foreign investment is its requirement. FDI can also increase the absorptive capacity of the country.

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