

The Impact Of Foreign Direct Investment On Technology Transfer In The Ethiopian Metal And Engineering Industries

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Abstract: This study examines the role of Foreign Direct Investment (FDI) on technology transfer in Ethiopian metal and engineering industries. Different researches and reports indicate that technological inflow through FDI is an important conduit in promoting local industries to upgrade and to be competitive in the market place. A quantitative survey of 47 metal and engineering industries indicates that the technological capability of local industries to adopt, modify and improve a given technology is very weak, un-collaborative operating environment between foreign and local industries and the national technology policies are very weak to be benefited from the FDI. In this regard, policies are putted and framework is developed putting the contributors to effectively transfer technologies to Ethiopian metal and engineering industries from FDI.

Index Terms: FDI, Metal and Engineering Industries, Technology Transfer, Technological Capability, Local industries, Technology Policy

1 INTRODUCTION

Today, technology has become the most important source of economic growth. It is well understood that economic growth results either from accumulation of factors of production or from improvements in technology or both. Developed countries conduct majority of the world's research and development (R&D) to have new technologies and improvements and technologies resulting from such R&D spread throughout the world through a multitude of channels like FDI, licensing, import of capital good, turnkey plants, cross-border movement of personnel, etc. Technology transfer through FDI has become the predominant channel of technology transfer. [5][11][19] FDI can have important technological spillovers in host economies, especially if it takes a joint-venture form subject to local control. Technology transfer has been a subject of considerable interest to many groups, such as government policymakers, international funding agencies, and business executives, because of the close relationship between technology transfer and economic growth. The experiences of countries which have built their technological capability in a relatively short period of time show that technology copying is an important vehicle for technological capability building.

The rapid catching-up of the East Asians with the developed countries is achieved, to a great extent, with transferred technology; reference is mostly made to Japan, Korea, China, Singapore and other Asian countries [1][2][3]. For the current era of increasing globalization, latecomer countries should follow the experience of China which serves as foremost example of benefits obtained from adopting FDI based technology transfer. The process of technology transfer to be followed in Ethiopia shall be one that utilizes lessons obtained from experiences of Asian countries taking into consideration the national context and global changes. The transfer of foreign technology plays a major role in the current endeavor in Ethiopia to bring rapid and sustainable economic development. As mentioned above, FDI is one of the means to bring foreign technologies to the country. Although Ethiopia does not have a separate policy for FDI the existing institutional and policy arrangements for investment are designed to facilitate the flow of investment from abroad. The country's investment law gives equal treatment for both foreign and domestic investors with some limited exceptions. The present Investment Proclamation No. 280/2002 and its amendment (Proclamation No. 375/2003) aim at, among others, the creation of various opportunities for foreign capital. There are also various tax and other incentives which obviously have a positive impact on facilitating the transfer of technology to Ethiopia via FDI. [57] The contribution of FDI to the economy of one country will be effective if and only if there is a local capability to absorb the technology owned by the foreign company to other similar industries which potentially dictates a large scale participation of local personnel's in the FDI companies at a critical level. [47] The contribution of FDI in Ethiopian economy has been hindered by the political ideology of the past regimes besides other socio-economic factors. Though the number of foreign investors currently destined to our country might not be small, but there is less technological flow from foreign investors. The ultimate objective of the study is to assess the contribution of foreign firms to the country's economy and specifically to the transfer of technology to local metal and engineering firms. This paper presents first, the methodology of the research. Next the relevant literatures about foreign direct investment and technology transfer. Finally, the result and discussions of

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the survey; followed by a conclusion.

2 RESEARCH METHODOLOGY

A quantitative survey with a pre-coded standardized questionnaire was used to collect data for the research. Based on the requirement of the study two types of questionnaires are prepared and each is developed for the foreign and local companies. The questionnaire was distributed in metal and engineering firms in Addis Ababa as a study area because the Largest FDI recipient (around 40%) and large scale enterprises are concentrated around it. The companies were selected randomly from those engaged in engineering and metal and metal product manufacturers. An employee of a company who has at least one year experience (high level technical and engineering background) was selected from those selected companies. In this study the questionnaire was distributed to 30 local and 25 foreign industries those filled and returned are 25 from local and 22 from foreign with a respondent rate of 85% and the data was analyzed using SPSS.

3 LITERATURE REVIEW

3.1 Foreign Direct Investment and Technology Transfer

Technology may be defined as the information necessary to achieve a certain production outcome from a particular means of combining or processing selected inputs. Technology can be a physical embodiment of an idea that is helpful for accomplishing a task or it may be disembodied as codified technology or as know-how. Technologies may be particular production processes, intra-firm organizational structures, management techniques, means of finance, marketing methods, or any combination of these. All contribute to the productivity with which outputs are generated from inputs and to the market value of those outputs. [5][6] In the world economy there is great inequality in technological efforts. An overwhelming proportion of scientific, technology, research and development activities take place in the advanced economies. Almost all patent applications are concentrated in developed countries. The same holds for scientific publications. Large multinational companies take the lead in innovation. [9] Moreover, there is a wide gap between those who have access to technology and use it effectively and those who do not. The technology gap exists between those who can create and innovate to produce new technologies and those who cannot. It also exists between those who can access, adapt, master and use existing technologies and those who cannot. So harnessing the potential of technology for development goes beyond creating new technologies but also transferring, adapting and using a technology that already exists for the benefit of all the population. [10] Technology transfer can be stated as an exchange of expertise and technology/knowledge from possessor to the recipient of technology. Technology transfer occurs because of the existence of buyers (transferees) and the sellers (transferor). Transfer of technology is more than just the moving of high-tech equipment from the developed to the developing world, or within the developing world. Moreover, it encompasses far than equipment and other so-called "hard" technologies, for it also includes total systems and their component parts, including know-how, goods and

services, equipment, and organizational and managerial procedures. Thus technology transfer is the suite of processes encompassing all dimensions of the origins, flows and uptake of know-how, experience and equipment amongst, across and within countries, stakeholder organizations and institutions. [63] FDI has more dominant international technology transfer channel than ever. Although non-FDI forms of international technology transfer have been growing since the 1960s, FDI forms have become dominant since the 1980s and are expected to become even more dominant in the foreseeable future. Factors accounting for this shift include, among others, the ongoing global trend of FDI liberalization, large-scale abolition of international trade barriers, increased globalization of economic activities, and the growing need for technological competitiveness in order to survive and grow economically. While admitting the importance of the level of FDI inflows, developing countries could, and should, make better technological exploitation of these inflows. FDI can provide a firm with new markets and marketing channels, cheaper production facilities, access to new technology, products, skills and financing. For a host country or the foreign firm which receives the investment, it can provide a source of new technologies, capital, processes, products, organizational technologies and management skills, and as such can provide a strong impetus to economic development. [42][43][44][45]

3.2 Technology Transfer in Ethiopia through FDI – review

The idea of modern science and technology in most African countries was introduced in the beginning of the 20th century. Even in the case of Ethiopia, it is believed that the first half of the 20th century is considered as the beginning of application of modern science and technology along with the establishment of higher learning institution although its role to bring about sustainable socioeconomic development of the country has not been to the desirable level. [57] During Menelik II era modern technologies are started and introduced to Ethiopia from the western technological advancement. He was fascinated by modernity and had a keen ambition to introduce Western technological and administrative advances into Ethiopia. [58] The notable tries had been performed technology transfer in Ethiopia during Emperor Menelik. It was Emperor Menelik who brought, through foreign engineer. Tap water (1894), electric power and telephone (1897), gramophone (1897), mills (1901), bicycles (1901), automobile (1908), bullet factory (1911) are a few among others. Due to wars and various attitude of religious closed door policies that existed even after the reign of Emperor Menelik, must have limited the country's external political and economic relations. This made the technological transfer very slow. [59] The main obstacle for these innovations was the resistance from the community which held that they were "the work of the Devil" – a resistance that stretched all the way from the common people to the priests around the Emperor who refused to drink tap water. The method that the Emperor used to curb such resistance was by testing the technologies first by himself, his family and his executives. For instance, he himself was the first chauffer, the first to use the grinding mill, the first photographer and the first movie spectator. Then technologies like the airplane and radio were

introduced in 1929 and 1936 respectively. [59] A number of technologies were introduced by Emperor Haile Selassie in and around Addis Ababa. These include the establishment of schools and universities as well as roads, the airline and TV transmissions. It is to be recalled that technological transfer was better particularly during the last days of the Emperor. When the Derg came to power in 1974, the country's diplomatic ties were diverted to the Eastern bloc. And as such, lots of technologies and communications were brought to the country from North Korea, East Germany and the USSR. As the policy discouraged private participation and innovation, and as the economy was under government control, the country was almost alien to new innovations. [60] During the past twenty years, Ethiopia, like many other countries, is experiencing the challenges as well as benefiting from the fast changing science and technology of our world. The government implemented a series of reform measures in order to change the command economic system that had been in place to a free market economy, to speed up the integration of the economy into the world economy and to encourage the wider participation of the private sector in the development process of the national economy (FDRE-MOFED, 2002). To increase the role of the private sector in the economy the privatization program was started in 1994. To date, the government had privatized 200 enterprises to domestic and foreign investors this gives opportunities for foreign investors to invest in the country. The reforms as well as the government introduction of investment guarantee schemes and incentives helped to raise the share of inward FDI in total investment from 0.04 percent in 1992 to 27 percent in 1997 (see figure). FDI flows to Ethiopia increased in absolute terms from an annual average of \$131 million in 1995 to 2000 and \$312 million in 2001 to 2006 although there are fluctuations due to unstable political environment of the country [51].

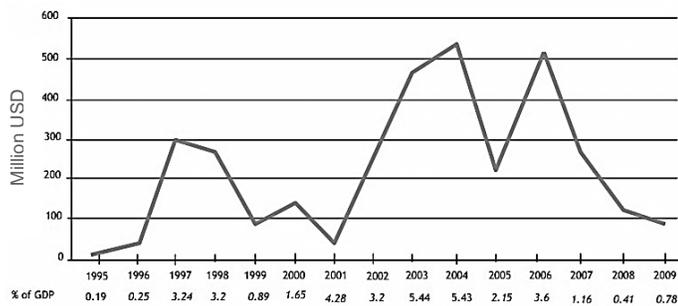


Fig. 1. Trends in the FDI flow to Ethiopia

Even if, the FDI flow increased the technological transfer in Ethiopia is said to be very slow. Cement, sugar factories, automotive and locomotive technologies still stand where they had been many years ago. On the other hand, the existing old and outmoded train technology is not handled properly and horse cart transportation has still not improved from what it had been many years ago. There can be no development without a sustained process of technological change. Technological change plays a most decisive role in development because of its influence on all significant aspects of economic and social life. In short, the market and transfer of technology is now the order of the day in Ethiopia.

3.3 The role of FDI for technology transfer: experiences of newly industrializing countries

The review of the socioeconomic development paths of the newly industrialized countries reveals that their initial conditions in early 1960s were not better than that of many of the African countries. Their economic structure was dominated by agriculture. However, their rapid and successful transformation into industrialized economies has amazed. A striking feature of the early development of the newly industrialized countries is that they largely sought to benefit from available technological knowledge from abroad. The experience of the benchmarking countries (China, Singapore, and Malaysia) on the role of FDI for technology transfer is summarized based up on the following specific points:

TABLE 1 ROLE OF FDI FOR TECHNOLOGY TRANSFER EXPERIENCES ON NEWLY INDUSTRIALIZING COUNTRIES

Policy and framework	
China [63][64]	<ul style="list-style-type: none"> In 1970s turnkey project investments are allowed but limited technology transfer. In 1978s the technology transfer policy reviewed and has opened the economy to as a joint venture investment. In 1994 and 1995 the country promote foreign investment in specified key sectors and published detail FDI guidelines which encourage investment in high-tech sectors. In 1998 the government merges the tax systems and on some foreign-invested enterprises the tax is doubled.
Singapore [68][69][70]	<ul style="list-style-type: none"> High degree of economic openness and internationalization. The government gives substantial funds from the government to develop required technology and automation system.
Malaysia [71][72]	<ul style="list-style-type: none"> In 1960-1985 the government employs import substitution and export promotion policies. The policy attracts foreign investors to invest in processing industries but failed to develop the indigenous industries. The government create new selective industrial policy to attract MNCs.
Ethiopia	<ul style="list-style-type: none"> FDI in principle welcome in most sectors. Regulatory policy framework governing FDI is based on a series of Investment Proclamations issued in different years in the country.
FDI impact on technology transfer	
China [65][66][67]	<ul style="list-style-type: none"> In the early 1990s much of the foreign investment was in relatively low technology, labor intensive, operations that took advantage of china's low wage costs. In 1998 with the change of the investment policies most of foreign industries are engaged in high technology sectors
Singapore [68][69]	<ul style="list-style-type: none"> In many industries including heavy metalworking and electronics Foreign companies provide technologies to upgrade the technology level. Training institutes are established by joint interaction with the government and the foreign investors.
Malaysia [72]	<ul style="list-style-type: none"> The Foreign Company's strengthen the science and technology institutions and stimulating private R&D enterprises.
Ethiopia	<ul style="list-style-type: none"> Technological transfer in Ethiopia through FDI is said to be very slow. Most of foreign investors are engaged in the resource oriented and labor intensive operations.

4 OVERVIEW OF BASIC METAL AND ENGINEERING INDUSTRIES

The Basic Metal and Engineering (BME) is a sub-sector within Manufacturing Sector. The sub-sector is further divided into basic metal industries and engineering industries. The basic metal and engineering industry is crucial to the development of any modern economy and is considered to be the backbone of human civilization. It is for this reason that the level of per capita consumption of steel is treated as an important index of the level of socioeconomic development in any country. It is a product of a large and technologically complex industry having strong forward and backward linkages in terms of material flows and income generation. All major industrial economies are characterized by the existence of a strong steel industry and the growth of many of these economies has been largely shaped by the strength of their steel industries in their initial stages of development. The Ethiopian condition on basic metal sectors reveals that basic metal industries lack the crucial component of producing basic metals from iron ore or other process route. Although, the engineering industries are still in the infancy stage over the years even if expansion of this industry is making a very substantial increment and is not likely to make a very potential contribution to the National Economy. The manufacturing sector as a whole and the basic metal and engineering industrial sub-sector performance is very low in Ethiopia. This is illustrated by the low valued added and the low share of manufacturing industries in the country's GDP which is only about 8.5 %. On average, metal industries was about 12.6 % of the manufacturing sector. With regard to gross value of production the basic metal industries constitute 0.56% to 7% of the manufacturing sector in the period 2002-2004. If we consider the performance of the basic metal industries in the year 2004, its contribution to the GDP is to the magnitude of 1%. Fixed capital asset of the sub-sector had increased in the years 1991-1996. However the share of fixed capital investment compared to other section was low which about 7.47%. Basic metal products that amount about Birr 2.76 billion and Engineering products amounting Birr 10.86 billion were imported in 2005 total import of basic metal products and engineering products has reached USD 1.48 billion. During this period, total import reached USD 4.38 million. The highest expenditure was on metal and engineering products (metal products, machinery and vehicles), which was 33.7 % of the total of import. There are few plants, which can be considered as engineering factory. The manufacture of machinery and equipment is almost non-existent with the exception of the former pump factory, truck, bus and tractor assembly plant and trailer manufacturing plant and the abandoned light aircraft assembly plant of Ethiopian Airlines. Different survey and researches indicate that most of the metal and engineering industries operate under their capacity. The reason for this is Scarcity of finance, Scarcity of raw materials and obsolete machinery in operation. Ethiopia, which is total importer of various machinery and equipment, has to devise strategies to develop the engineering industry in order to improve its foreign trade deficit in the long range. Overall, it can be inferred that the contribution of the basic metal industries to the overall economy is minimal which indicates that there is much to be desired from this industry if it has to position itself to a

level where it can be a real contributor to the economy. However, the overall trend of the industry is very much encouraging if it continues to grow, especially in a better enabling environment. Therefore, improvement in this sector can help to cut import figures by increasing locally produced primary products and equipment.

5 DATA PRESENTATION AND ANALYSIS

The primary data was obtained from the questionnaire which is designed to collect the necessary data and organized in the same way the measurement questions in the questionnaire are organized which prepared for both domestic and foreign metal and engineering firms. The questionnaire is grouped in to different headings to show the level of technology transfer from foreign based companies. The headings are the level of collaboration between foreign firms and local company's (industry-industry relation), the effect of FDI in local the presence of foreign investors and the response of the local companies, diffusion of technology to local companies and policies to encourage technology absorption from FDI are analyzed and the findings are discussed here.

1. Level of Local Technological Capability

The technological capability of a firm is the capacity to deploy resources, usually in combination, using organizational processes, to achieve a desired end. For most least-developed countries, technological progress is mainly a process of adoption and adaptation of technologies from abroad rather than the creation of new technologies. In this regard the local company capability is assessed by using different points that can imply the capability of the local technology.

TABLE 2: LEVEL OF LOCAL TECHNOLOGICAL CAPABILITY

	Totally unable	Slightly capable	Capable	Highly capable	Extremely capable	Mean	Sta.Dev.
Ability of the company to make effective use of imported technology	20	48	28	4	0	2.16	0.8
Flexibility of the company to adopt the changing nature of product and service	4	64	24	8	0	2.36	0.7
Local technological capability to absorb, improve and emit the transferred technology	44	40	16	0	0	1.72	0.73

The finding indicates that local companies have the capability to use imported technology but improvement and adoption of the technology is weak.

2. Industry –industry relation

The result shows that 48, 32, and 16% of respondents responded saying limited, extremely poor and fair collaboration respectively and the remaining 4% respond the collaboration is very good. In general, the level of collaboration between foreign and local firms in sharing technological software and hardware is limited (Mean=1.92, St.deviation=0.812) and from the respondent most of the

reasons for these are:

- i. Lack of trust between companies
- ii. Cultural difference between foreign and local investors

The training and/or consultancy from foreign based companies to the local firms has been assessed and 40% confirmed that they had training from foreign companies and while the rest 60% did not. The government's effort in assuring participation of local engineers and technicians during implementation of technology intensive projects and industries in association with foreign firms is low (44%), somewhat participant (32%) and participant (24%). This shows that participation level of the government in inclusion of local engineers and technicians in technicians in technology intensive projects is low (Mean=1.8, Std.deviation=0.816).

3. The effect of foreign investors in local companies

Foreign investors have a positive and negative effect on the economy of a given country. The respondent argued that foreign investors have positive impact on access to export market and availability of raw materials or inputs; and a negative impact on cost of skilled manpower, demand for company's product and ability to compete in the local/domestic market; and the foreign firms are no effect in access to finance and business opportunity.

TABLE 3: STATISTICS FOR THE EFFECT OF FOREIGN INVESTORS IN LOCAL COMPANIES

	strongly negative	slightly negative	No effect	Slightly positive	Strongly positive	Mean	Std. Dev.
Overall ability to compete in the market	12	36	36	8	8	2.64	1.075
Business opportunity	8	20	56	12	4	2.84	0.898
Demand for companies product	20	36	28	12	4	2.44	1.083
Cost of skilled labor	16	44	32	8	8	2.32	0.852
Availability of raw material and inputs	0	12	36	44	8	3.48	0.823
Access to finance	0	8	76	16	0	3.08	0.493
Access to export market	8	20	20	36	16	3.32	1.215

From the result foreign firms can open the way for local companies to enter into the global market this is because foreign investors have access to enter into the global market. However, due to the capability, product quality and differentiation foreign firms have an opportunity to dominate in the domestic market and cost of skilled manpower is increased due to the existence of foreign firms this is because of the difference in salary in foreign and local firms.

4. Policies to encourage technology absorption from FDI

The technical and economic incentives available in particular to industries that have the potential to make critical and major contributions to technology transfer to the country has been assessed. 44% of the respondent argued

that the technical and economic incentives are not encouraging; 40% respond the incentive is slightly encouraging; 12 and 4% respond that the incentives are encouraging and highly encouraging, respectively. The result shows that the incentives are not that much encouraging for local as well as foreign firms to make critical and major contributions to transfer technology to the country. Most of the respondents argue that the government should focus and give incentives for engineering industries and high technology investments rather than less technological intensive sectors like agriculture and food processing industries.

6 DISCUSSION

The basic building blocks for the establishment of a conducive framework for technology transfer and dissemination in Ethiopia include the following:

Boosting absorptive capacities of domestic enterprises:

In order to maximize technology dissemination in Ethiopia specifically to basic metal and engineering industries, it is imperative for governments to establish and implement policies that help enhance the absorptive and adaptive capacities of the firms. This involves creation of skilled workforce through the interaction of the industry (BMEI's) and institutions to promote high quality, competitive domestic industries.

Joint venture and equity ownership requirements:

equity requirements have been employed by host governments to enhance the chances of technology and knowledge controlled by foreign affiliates being diffused to the domestic enterprise sector in the host country. The government must identify and give priority or incentives for joint venture and high technology investments to strengthening the BMEI's.

Attracting foreign investors in specific sectors:

governments need to target the promotion of specific technologies relevant to basic metals and engineering industries in their development strategies. Governments can seek to attract foreign investors into these industries, by using fiscal or financial incentives. Targeting foreign companies that are already present in country can also be part of this strategy, for instance by offering incentives to move into more complex technologies and to increase or upgrade the technological R&D undertaken locally. The Ethiopian Investment Agency can play a central role in targeting foreign investors that are technology leaders in the area of metals and engineering industries and in providing after-care.

Promoting technology dissemination through linkages:

technology alliances and linkages between foreign and domestic metal and engineering firms are among the key modes of transmission of know-how and technology. Backward linkage programs between foreign firms and domestic suppliers could involve intensive consultation, training and technology transfer between foreign firms and potential domestic suppliers through design specifications and process improvement.

Local Supplier Upgrading:

efforts to link locally owned supplier firms with foreign “mentor” multinational corporations can be an effective way of improving levels of technology, particularly in local firms. The Ethiopian government should facilitate to implement the Local Industry Upgrading Program and enter into contractual relationships with foreign metal and engineering firms to transfer experienced technical and managerial employees to local firms. As a result of this initiative, local suppliers can able to transition out of low-wage, labor-intensive industry into more capital- and knowledge-intensive industries.

Provide technical and economic incentives:

The government should provide technical and economic incentives, in particular to metal and engineering industries that have the potential to make critical and major contributions to technology transfer to the country. Some local engineering companies try to make improvement in the production process by improving the production equipment and machinery so the government must give incentives for this kind of firms.

Engage domestic Engineers in technology intensive projects:

Participating domestic engineers and technicians in high technology intensive projects is important to adopting new technologies and know-how in the sector. Ethiopia has opened its doors to foreign direct investment to improve the livelihood of the nationals in the short term and to benefit from technology spillover as a long term goal. However, foreign investors are highly interested on the utilization of cheap manpower and natural resources of the country as found from the survey. To be specific, the leather, textile, and the agricultural sectors are the main ones partly because of the country's policy interest towards these sectors. As a result, the number of investments conducted on high tech industries is so limited and our ambition to benefit from the technology spillover via these carriers is still blurred. To change the situation the government is supposed to focus on the following policies:

Priority for Technology Intensive FDI:

FDI could serve as a technology transfer channel on condition that, the type of investments are technology intensive in comparison with those found in the local market. In this account, the government should focus on basic metal and engineering industries from the less technological intensive sectors.

The Placement of Local Content Requirement:

In this case, the government should place a time frame for foreign firms to go to subcontracting arrangement or local supplier development activity with the objective to diffuse their technological knowhow to the locals. From the experience of the Chinese auto industry, the placement of such agreements will enable FDI's to manufacture some components within the locals otherwise to get heavy taxes and even a fine for that. For example, it is common to see auto assemblers in Ethiopia which are making profit only from cheap labor available while the technology spill over they contributed is insignificant.

Participation of local personnel's:

Besides the presence of local content requirement for foreign firms, there should also be an agreements placed in order to assure the presence and the participation of the local employees at key position of the foreign firm. In doing that, it will be possible to speed up the spillover of technical knowledge from the foreign firm to the local industries. The assurance of local participation must not be limited to FDI only; the government should assure the local participation during the implementation of large scale project by foreign contractors.

7 PROPOSED FRAMEWORK

In order to make effective flow of technology from FDI there must be a clear framework that shows the interaction between different actors in the process. The conceptual framework for technology transfer is developed by combining the experience of benchmarked countries so that the Ethiopia metal and engineering industries would benefit to the maximum possible extent. The implementation of the framework will enhance the technology transfer nationwide by facilitating the interaction between the government, foreign investors and local industries which are the most important parts in the process of technology transfer through FDI.

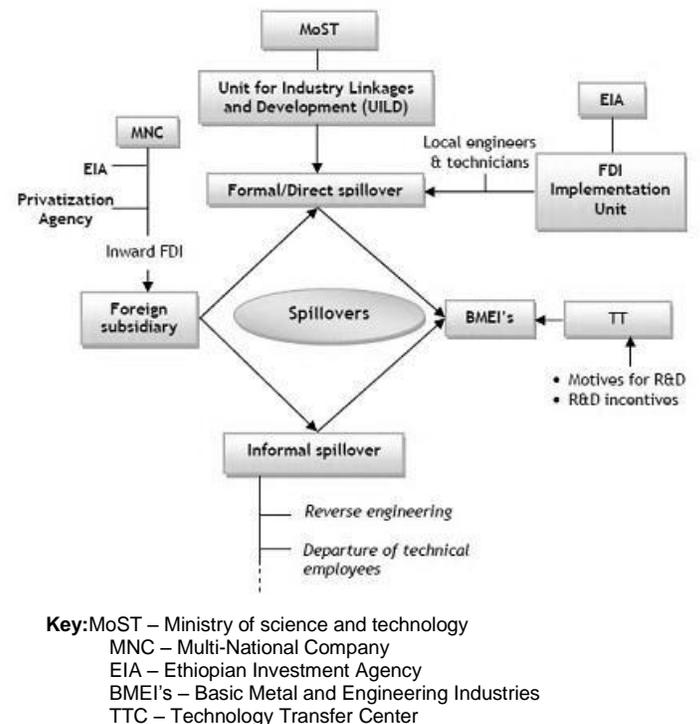


FIG. FRAMEWORK OF TECHNOLOGY TRANSFER THROUGH FDI

Role and functions of selected actors in the frame work

1. Ethiopian Investment Agency (EIA)

- Promoting the country's investment opportunities and conditions to foreign investors;
- Issuing investment permits, work permits, trade registration certificates and business licenses;
- Registering technology transfer agreements and export-oriented non-equity-based foreign enterprise

- collaborations with domestic investors;
- Negotiating and, upon government approval, signing bilateral investment promotion and protection treaties with other countries;
- Advising the government on policy measures needed to create an attractive investment climate for investors; and
- Assisting investors in the acquisition of land, utilities, etc., and providing other pre- and post-approval services to investors.
- Fostering partnership between investors and government agencies concerned.

2. Unit for Industry Linkages and Development (UILD)

- Establish partnership with foreign investors and to collaborate them to local firms.

3. FDI implementation unit

- Understand and address concerns of investors;
- Understand and address concerns of approving authorities;
- Facilitate the participation of local industries and institutions;
- Initiate multi agency consultations; and
- Refer matters not resolved at the FIIA level to high levels on a quarterly basis, including cases of projects slippage on account of implementation bottlenecks.

4. Local industries

- The government should motivate the R&D activity in local industries this activity can be done by unit for industry linkage and development.
- By giving incentives for industries engaged in R&D activity.
- The government should allow for local industries to import high technology equipment's and machineries with duty free.

8 CONCLUSION

FDI can generate spillover effects and it can take the form of horizontal and vertical linkages. Some scholars argue that FDI can also facilitate technology transfer to host countries through upstream and downstream industries (i.e., through vertical linkages). In other words, vertical linkages are also important mechanisms of FDI spillovers. It is well known that the magnitude of spillover effects depends on absorptive capacity of the host industries. In other words, the size of effective spillovers depends on the extent to which domestic firms respond positively to factors such as technology gap and human capital. This research considered the impact of FDI generated technology transfers on local metals and engineering industries. From the experience of the leading developing countries, their current development comes from applying different FDI strategies and policies in selected sectors. In effect it develops the local technological capability. From the survey the technological capabilities of local metal and engineering industries is weak to transfer technology horizontally or vertically from foreign firms. This is because most of the foreign companies are engaged in labor intensive low technology production system and also the collaboration of foreign and local companies are weak in the intention to

transfer technological knowhow. The result also supports that technology transfer and spillover is dependent on the absorptive capacity of the firms. This absorptive capacity mainly depends on the R&D activity and expenditure in local firms and the result shows the spending on R&D by Ethiopian firms is very low. Although, it is seen that the more competitive the industry, the greater extent of technology spillover. It's also observed in this study that local industries failed to compete with foreign firms. In addition, the government has an important enabling role in determining technology transfer to local firms. The present policies encourage enterprises to introduce more foreign capital, products and brands, but few advanced technologies are introduced till now and not much attention is paid to digest and absorb the introduced technology for the domestic industries. From the analysis the researcher propose a solutions and policy options and develop a frame-work for effective transfer of technology through FDI.

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REFERENCES

- [1] Kadah Mohamed Mansour, FDI and International Technology Transfer to Egypt, Cairo Egypt, Economic Research Forum, 2008.
- [2] UN Conference on Trade Development, Reducing the Technology gap, United Nations Conference on Trade and Development, 2002.
- [3] Industrial Partnership, Technology transfer: the history, USA, Industrial Partnership office, 2005.
- [4] United Nations Conference on Trade and Development, Investment and technology policies for competitiveness: Review of successful country experience, New York, United Nations, 2003.
- [5] Bernadette A. et al., Technology transfer to china: A theoretical approach, China, University of Limerick, Vol. 3, pp. 277-308, 1998.
- [6] Kumar Nagesh, Intellectual Property Rights, Technology and Economic Development: Experiences of Asian Countries, India, Commission on Intellectual Property Rights, 2003.
- [7] MoST, Ministry of Science and Technology, National Science, Technology and Innovation Policy: Building Competitiveness through Innovation, Addis Ababa, Ministry of Science and Technology, 2006.
- [8] Cincera M., et al., Foreign firms and technology spillovers in developing countries: the Turkish case, Turkey, Science and Technology Policy Research Center, n.d.
- [9] Maskus E. et al., Encouraging International Technology Transfer, Colorado, UNCTAD/ICTSD capacity building project, 2003.

- [10] World Bank, Economic development report, World Bank, 1999.
- [11] Evans et al., Knowledge Society and the Knowledge Gap, Germany, University of Bonn, n.d.
- [12] United Nations, Management of technology, Austria, United Nations, 2001.
- [13] UNCTAD, Foreign Direct Investment and the Challenge of Development, Geneva, United Nation Publication, 1999.
- [14] Young Stephen, et al., Technology Transfer to china through FDI, London, Regional Studies Association, Vol. 31:7, pp. 669-679, 1996.
- [15] Cusumano R., et al., Linking international technology transfer with strategy and management, Res policy, Vol. 23, 1994.
- [16] Dunning J.H., Re-evaluating the benefits of FDI, Lexington, Transnational Corporation, Vol. 3, 1994.
- [17] Gulelat G, Technology Transfer: the case of Japan and Ethiopia, Addis Ababa, Addis Ababa University, 2010.
- [18] Adejumobi, et al., The History of Ethiopia, USA, Greenwood Publishing Group, Inc., 2007.
- [19] Marcus G., et al., History of Ethiopia, Los Angeles, University of California, 1994.
- [20] Getinet H., Determinants of Foreign Direct Investment in Ethiopia: a time series analysis, Addis Ababa, University of Westminster, 2006.
- [21] United Nations, Management of technology, Austria, United Nations, 2001.
- [22] Zhang H., Encourage the pluralism of investment subjects, China, Heilongjiang Daily, 2007.
- [23] Fong Aik, Japan Singapore technical institute International Corporation in Human resource development for inclusive growth, Singapore, Nanyang Polytechnic International, 2010.
- [24] Park Donghyun, Foreign Direct Investment and Corporate Taxation: Overview of Singaporean Experience, Singapore, Nanyang Technological University, 2004.
- [25] Kwan S. et al., Some aspects of technology transfer in Hong Kong, Hong Kong, Hong Kong Productivity Council, 1991-92.
- [26] Rock M., et al., Technology transfer through Multinational companies, 1998.
- [27] Mohammad S., et al., FDI and Economic Growth in Malaysia, Malaysia, University of putra, 2009.
- [28] Chen Xi, The influence of FDI on china tourism industry, Auckland University of technology, 2010.
- [29] United Nations, World Investment Report, United Nations, 2006.
- [30] Ding Li., Study on the Influence of Foreign Direct Investment in Chinese Foreign Trade, China, Changehun University of Science and Technology, Vol. 2, 2009.