



**FACTORS AFFECTING TECHNOLOGY  
TRANSFER BETWEEN DOMESTIC AND  
FOREIGN OWNED TEXTILE COMPANIES IN  
ETHIOPIA**

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### **Declaration**

I hereby declare that this thesis entitled “Factors affecting technology transfer between domestic and foreign owned textile and garment companies in Ethiopia” was composed by myself, with the guidance of my advisor, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted, in whole or in part, for any other degree or professional qualification.

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## **Abstract**

In textile sector, which is one of the priority areas in Ethiopian manufacturing sector, technology transfer is a backbone for the competitiveness of domestic companies in the international market. Presently, the contribution of the sector to GDP of the country is very low due to different reasons, including the poor technology and knowledge transfer between domestic and FDI firms in the country. This study attempts to assess the status of technology transfer between domestic and foreign owned textile companies, the capacity of the domestic textile companies to absorb new and improved technologies and analyze the factors affecting technology transfer. Primary and secondary data were collected using questionnaire, structured interview and document review methods in 56 textile companies located around Addis Ababa and the data was analyzed using simple descriptive statistics and binary logistic regression model. The current status of technology transfer between domestic and foreign owned textile companies and the absorptive capacity of domestic companies is found weak. The regression results show that the predictors access to financial capital, periodic reinvestment rate and skill of employees have a significant effect on technology transfer between foreign and domestic textile companies in Ethiopia. It is recommended that financial institutions may loosen their financial and credit laws and provide finance to business enterprises easily, and domestic companies are also recommended to strengthen their internal financial capacity by maximizing their rate of reinvestment.

Key words: technology transfer, FDI, absorptive capacity

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## **List of abbreviations**

EIC – Ethiopian Investment Commission

ETIDI – Ethiopian Textile Industry Development Institute

FDI – Foreign Direct Investment

FOE – Foreign Owned Enterprises

GOE – Government of Ethiopia

GTP – Growth and Transformation Plan

MNC – Multi-National Companies

MOI – Ministry of Industry

MOST – Ministry of Science and Technology

TNC – Trans National Companies

TT/TOT – Transfer of Technology/ Technology Transfer

UNCTAD –United Nations Conference on Trade and Development

# CHAPTER ONE

## INTRODUCTION

### 1.1. Background:

Transfer of Technology (TOT) or technology transfer (TT) is the movement of different technologies of production and services from company to company, or from nation to nation through different methods. Jafarieh, (2001) defined TOT as

*"The acquisition, development, and utilization of technological knowledge by a country other than that in which this knowledge originated."*

The transfer could be of material, design and/ or capacity transfer (Jafarieh, 2001). And there are different channels of technology transfer. The mainly used methods are, licensing, franchising, support contract, joint venture, alliance, turnkey, equipment acquisition, management contract, foreign company acquisition, foreign direct investment, original equipment manufacturer and so on (Jafarieh, 2001). Foreign direct investment (FDI) is the most commonly used method of technology transfer especially in developing countries (Osano & Koine, 2016).

FDI is able to build local technological capabilities through vertical and horizontal linkages. (Diyamett & Mutambla, 2014). It is currently the dominant method of transfer of technology in most countries' economies (Kadah, 2008). Especially in developing countries, according to World Bank (2008) and Osano & Koine (2016), net FDI flows to developing countries rose from US\$ 367 billion in 2006 to US\$ 471 billion in 2007. This accounted for more than 25% of global FDI inflows (UNCTAD 2008).

Ethiopia is a developing country being one of the currently fast growing economies in the world. It is attracting FDI by developing different attractive investment policies, and maintaining suitable investment environment. The latest IMF data shows that since 1992, the failure of the Dergue regime, the percentage share of FDI in the country's economy was increasing and accounted 5.51% in 2016. (IMF, 2016). The number of Multi-National Companies (MNCs) who are engaged in different sectors in the country is also increasing. In addition to this, the number of domestic investors is also increasing parallel to it. Since 1992, more than 3000 local and foreign investors are registered to be engaged in manufacturing sector (EIC, unpublished data, 2017). Textile sector is one of the priority areas chosen by GOE to lead the labor intensive light manufacturing industry and contribute high share to the country's economic growth. It is planned, at the end of the second growth and transformation plan (GTP 2), that the sector will contribute a 0.9% production share to the economy and USD 1 Billion export share, which is the highest export share as compared with the other prior sectors (MOI, 2014/15). The GOE should facilitate the essential requirements and make the investment environment suitable to the private sector to reach to the planned economic growth. It should enjoy the opportunities of employment to its nationals, introduction of new and improved technologies, and foreign currency in all sectors. For textile sector, too, the transfer of technology plays a major role in empowering local companies to be competitive in the local and global market.

## **1.2. Problem statement**

Past political systems in Ethiopia had great impacts on the development of the country's economy. In the past regimes, especially in the Dergue Regime, the socialist political economy had a negative impact on investment and capital formation. No FDI was encouraged and most local investors were tied by fixed capital ceiling and were thus weakened to compete in local and foreign markets. Almost all industries were owned by the government. This led the country's economy to grow downward and consequently there was no technology transfer, no employment and no manpower's skill development. Unemployment rate was also high (UNCTAD, 2002).

Following the downfall of the Dergue regime, the EPRDF-led government of Ethiopia adopted a political economic policy of agriculture-led industrialization that encourages the private sector to play the major role. The policy environment created investment opportunities for both local and foreign investments. The UNCTAD (2002) report shows between years 1992 and 1998, the number of domestic and foreign investment already in operation was 1,178. And the GDP growth before 1992 was 0.6% and grew to 10.6% in 2014 with a share growth of the manufacturing sector from -2.3 to 11.7% in the same year interval (Shiferaw, 2017). This increment in FDI attraction and domestic investment results a large amount of employment opportunity, technology transfer, and generally contribute to the GDP of the country. But the level of technologies transferred yet to local companies is very low as compared to the expected level. This is said based on the poor performance of textile sector and its least contribution to the GDP of the country (26.6% of its production

plan, 15% of its export plan performed, and labor productivity reaches only 50% of the standard). One of the reasons for this poor performance is the poor technology capability of firms (MOI, 2014/15). This could be due to different reasons, such as lack of trust between companies to share their experiences due to fear of market competition and cultural difference between local and foreign investors i.e. the way they communicate to one another is distinctive (Lemma, Kitaw & Gatew, 2014).

Some researches had been conducted regarding the issue of FDI and technology transfer in Tanzania, Kenya, and Egypt and tried to show the contribution of FDI to technology transfer and the factors affecting technology transfer. A research conducted in Ethiopian metal and engineering sub sector also reveals the current status and capacity of local metal and engineering companies and their capacity to absorb technology from foreign companies. But the study areas and the sectors are different from Ethiopian economic, social and political aspect. Again the study conducted in Kenya shows technology transfer as an intervening variable between the independent variables and the dependent variable, economic growth in energy sector in particular. The study conducted in Egypt only focuses on the contributions of FDI to technology transfer and economic growth.

Based on these researches and the gap that the study was not conducted in Ethiopia, this study attempted to address the current status of TT, the absorptive capacity of domestic companies and the factors affecting technology transfer between local and foreign owned textile industries and fill the gap of research based information in the sector.

### **1.3. Objectives of the research**

#### **1.3.1. General objective:**

The overall objective of this research is to assess the factors affecting technology transfer between local and foreign companies in textile and garment sub sector.

#### **1.3.2. Specific objective:**

The specific objectives are;

- To assess the status of technology transfer between foreign and domestic companies in Ethiopia.
- To assess the absorptive capacity of local companies to host new technologies in the sector.
- To identify the factors affecting the transfer of technology from foreign firms to locally owned textile companies.

#### **1.4. Research questions:**

1. What is the status of technology transfer (TT) between foreign and domestic firms in Ethiopia?
2. How capable are the local companies to absorb new technologies from foreign owned companies?
3. What are the factors affecting TT in the sector?

#### **1.5. Significance of the study:**

Textile sector is one of the sectors which has been given priority in Ethiopian industrial policy. The labor intensive behavior of the sector makes countries with high working manpower to opt it. Ethiopia is one of the countries which have a huge number of working man power and a large amount of resources. This study is also

expected to contribute to the sector in assessing the current status of technology transfer, the factors affecting or the bottlenecks of the level of technology expected to be transferred and giving clue to solve the problems and finally make the sector a leading contributor to the GDP.

#### **1.6. Limitation of the study**

The initial intention of this study was to conduct on the factors which affect the transfer of technology between local and foreign companies in manufacturing sector at large in Ethiopia. However, due to shortage of time and budget, the study had tried to assess in textile sub sector only. It will also be not able to make the assessment in all eligible companies located in the whole country, but will be done in companies located in Addis Ababa and around. This is also due to lack of time and resource budgeted for the study.

#### **1.7. Operational definition of key terms**

- Technology transfer: the transition of know-how to suit local conditions, with effective absorption and diffusion both within a country and from one country to another.
- Foreign Direct Investment (FDI): is an investment made by a firm or individual in one country into business interests located in another country. FDI takes place when an investor establishes foreign business operations or acquires foreign business assets, including establishing ownership or controlling interest in a foreign company.

- Absorptive capacity: is the set of strategic organizational routines and processes that make it possible for companies to acquire, assimilate, transform and exploit knowledge to create dynamic capabilities.

## CHAPTER TWO

### LITERATURE REVIEW

This section provides the theoretical setting and conceptual framework that guided the study. It first elaborates the concept of technology transfer, FDI and its contribution to TT. Then, the literatures related with indicators of status of TT relationship between domestic and FDI companies, the absorptive capacity of domestic companies and factors affecting TT were reviewed. In addition to this the status of FDI and technology transfer and the textile sector in Ethiopia are also reviewed.

#### 2.1 The concept of technology transfer

According to Wahab, Rose & Osman, (2012), technology consists of two primary components: a physical component which comprises of items such as products, tooling, equipment, blueprints, techniques, and processes; and the informational component which consists of know-how in management, marketing, production, quality control, reliability, skilled labor and functional areas. This technology has a nature of transferability and can be transferred from nation to nation or from company to company within a nation, i.e. technology transfer.

The concept of technology transfer is broad. UNECA (2014) defines technology transfer as

*“the process of deliberate and systematic acquisition/provision/sharing/licensing of equipment and machinery, technology, skills, knowledge, intellectual property rights, business and organizational processes, designs and facilities, for the manufacture of a product, for the application of a process or for the rendering of a service.”*

For this research purpose, based on the definition of Wahab, Rose & Osman, (2012), the concept of technology transfer is defined by ‘the transfer of physical components (product, machinery and equipment, blueprints) and informational components (managerial and other process areas) from FDI to the host country national owned companies.’

It is clear that technological progress is the most important contributor to acquire sustainable economic growth for a country. It has been and continues to be a means by which latecomers to the development process can accelerate their own development by acquiring knowledge, experience and equipment that are known to have been successful in the more advanced countries (UNECA, 2014). Because of the lack of capacity to create and use new technologies, developing countries prefer to strengthen their economy and technological capability by imitating existing technologies from those developed countries through different means of diffusion (Jabbour & Muchielli, 2005).

Technology transfer affects productivity and competitiveness through its effect on the quality of human capital. A healthy labor force (with reduced absenteeism rates and health-care costs) not only lowers costs for incumbent firms and enhances their productivity; it also encourages new firms to enter into the country. In order to enjoy the benefits from technological advancement, African countries need to be aggressive like the developed countries that have advanced technologically and are still scanning the globe for the latest information about technological development and the changes it brings (Ejiwale, 2014)

Technology transfer can be done through different channels such as licensing, contract agreement, franchising, FDI, and so on. MNCs play a crucial role for transferring technology across borders by creating vertical and horizontal linkages with the host companies. MNCs can also transfer technology directly (internally) to their foreign owned enterprises (FOE) through their expatriates (UNCTAD, 2000).

## **2.2 FDI and its role to technology transfer**

According to Naanaa & Sellaouti (2013) the multinational firms have a spillover effect on domestic firms which provides the diffusion through physical contact between the holder of technology and one who will receive it. Thus the knowledge brought by the multinational firms is likely to diffuse through links between suppliers and customers. However, imitation facilitates upgrading and strengthening R&D. The Relations with the multinational firms are an effective channel of technology diffusion for the host country. In this context, we find that multinational firms have an important role. First they behave as a demonstrator for stimulating local businesses. They constitute a new channel to export where learning occurs through observation. Similarly technology transfer between multinationals and their subsidiaries do not operate only through the machinery, equipment, patents and expatriate managers and technicians, but also through training of local employees of subsidiaries. This training applies to most employment levels. Furthermore, technology transfer can take place also through imitation and copying technologies and management methods and organization that would improve productivity. Foreign direct investment (FDI) is considered as an explanatory factor for the total factor productivity. FDI involves technology transfer and in fact constitute a powerful source of learning whose

benefits are spread across sectors by the mobility of the workforce. In addition to the import of capital goods and the purchase of technology and licensing, it becomes theoretically a crucial means to exploit the global knowledge and facilitate technological change and promote productivity growth.

FDI is becoming the most dominant channel of TT than ever. Kadah (2008) argues that the reasons for the shift of channels of technology transfer to FDI are 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.

UNCTAD (2014) also discusses about the other role of FDI as a channel of technology transfer concerns the internationalization of research and development operation of TNCs. This increases opportunities for technology transfer as well as improves the conditions for technology creation in the new environment. This may enable some host countries to strengthen their technological and innovation capabilities. As international firms have always needed to adapt technologies locally to achieve commercial success in their host countries, and, in many cases, some transfer of research and development was necessary. Increasingly, MNCs are setting up research and development facilities in developing countries that go beyond adaptation for local markets. This is an important shift in innovation potential as conservative estimates suggest that MNCs account for close to half of the global research and development expenditures and at least two thirds of business research and development expenditure.

### **2.3 Indicators of a status of technology transfer between local companies and FDI:**

A country must have the information about the level of technology transfer linkage between local and FDI companies to make different decisions. This level of technology transfer could be measured using different point of views and indicators as well. Forward and backward linkages are found the main indicators of linkages between the two (Diyamett & Mutambla, 2014). In addition to the forward and backward linkages, training of local manpower and direct competition are also other indicators of technology transfer between local companies and FDI (Kadah, 2008). Osano & Koine (2016) also believes that there are two indicators of linkages. They are the simple observation or experience sharing visit of local firm to FDI and the market competition between both. A research conducted on the impact of FDI on TT in Ethiopian metal industry used training the local firms received from FDI (skill development of manpower) as an indicator (Lemma, Kitaw & Gatew, 2014). The training of local firms was also mentioned in Naanaa & Sellaouti, (2013) as one of the contributions of FDI to the host countries.

Based on Ethiopian manufacturing sector context and its scope, the study had chosen the training given to employees of domestic companies by FDI, the experience sharing visits done by domestic firms to FDI, the rental of machineries, and the production orders given by FDI companies to domestic companies (forward or backward linkage) are used as indicators of the status of TT in Ethiopian textile industry.

## **2.4 Absorptive capacity of recipient companies:**

Absorptive Capacity is the set of strategic organizational routines and processes that make it possible for companies to acquire, assimilate, transform and exploit knowledge to create dynamic capabilities. It allows a company to search for knowledge that can help to satisfy specific needs; and is the result of past innovation and the company's problem-solving capabilities (Zahra & George, 2002). The study divided this capacity into two major phases, i.e., potential absorptive capacity (includes acquisition and assimilation capacity) and realized absorptive capacity (includes exploitation and transformation capacity). Seckin (2015) argues that knowledge diffusion is completed only when the transferred knowledge is internalized and translated into the capability of the local suppliers.

Different authors' findings show that there are different factors as indicators of absorptive capacity. Five categories are cited in Ayala & Campo (2015) based on different authors' arguments as indicators of absorptive capacity. Cohen & Levinthal (1990) argued that R&D is the first category as absorptive capacity is the byproduct of R&D. The second category includes the individual characteristics of the company; type of staff hired, staff skills, and management abilities are the most important as of Escribano et al., 2009;. . The third category of indicators as the arguments of Mangematin and Nesta, 1999 is comprised of scientific output measures. Knowledge participation is measured as the percentage of research communities associated with a scientific field, including the number of publications within a scientific community. The fourth category of Absorptive Capacity quantitative measures includes variables that measure participation in company networks or alliances. Mangematin and Nesta

(1999) find that companies have close links to scholars and measure this variable using event participation. The fifth category includes the variables measuring Absorptive Capacity through the organizational structure. Minbaeva et al. uses dichotomous variables that measure the presence of human resources management practices and employee ability as measured by performance assessment. Seckin (2015) also finds out that the critical factors affecting absorptive capacity are knowledge production, knowledge flow within the company and knowledge flow within the sectoral innovation system.

Omar, Takim & Nawawi's (2011) findings shows the factors employees' ability, employees' motivation, company size, company age, share of expatriates, financial capacity, innovation performance, i.e. expressed in terms of annual financial turnover of the company are the main indicators of absorptive capacity.

Based on the status of textile sector in Ethiopia, five main indicators are selected for this research. These are the financial capacity of the company, size of the company, annual reinvestment percentage of its profit, skill of its employees, and the number of expats hired in the company.

## **2.5 Factors affecting technology transfer**

Kumara, Luthrab, Haleemc, Manglad, &Garges' (2015) findings shows that regulatory issues, relative advantage in economic terms, reliability of the transferor in technical factors, marketing related benefits and forces, commitment in managerial and strategic issues are the most important critical factors affecting TT. Kadah (2008) also argues that the degree of success of transfer of technology depends on the macroeconomic and regulatory environment of the host country, the system of

protection of IPR, availability of TT incentives and so on. Osabutey & Jin (2016) also find out that, relative advantage in economic terms, marketing related benefits and forces, technical features, regulatory concerns and managerial and strategic issues are the critical factors affecting TT.

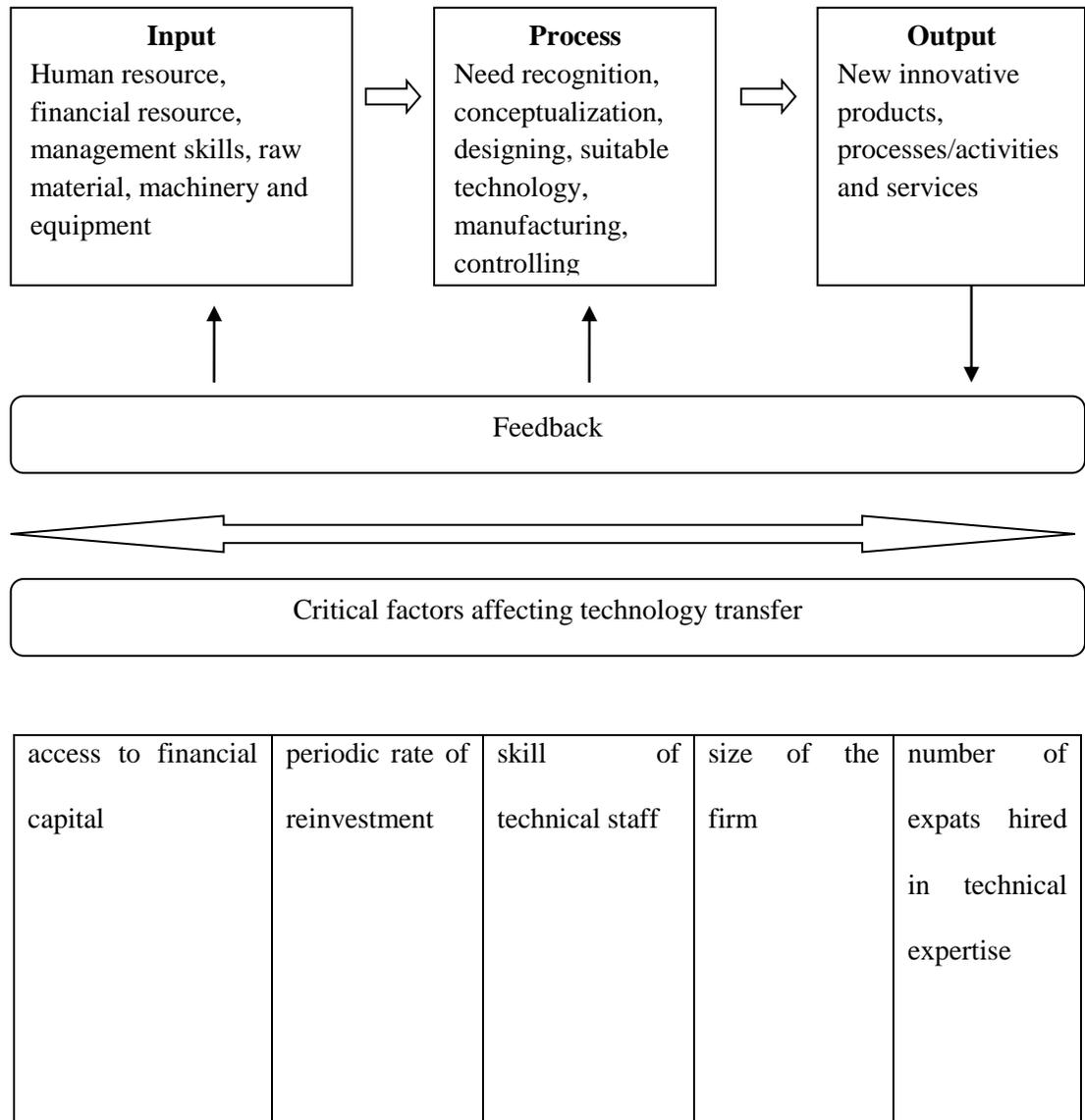
Dunning (1998) and Caves (1996) also agreed that production cost-related factors, quality and skill of professional elements of labor, competitiveness of related firms, quality of local infrastructure and institutions, and macroeconomic policies in the recipient countries are the main factors affecting TT.

Malik and Hattasinghe (2013) identified four determinants of TT as, less congestion of firms (foreign and local), government policy incentives, effectiveness in intermediate industry institutions, and educational effectiveness. The organizational structures which inhibit the flow of communication between different groups, the technology imposing specialized knowledge on the people who work with it and the individuals themselves who have cultural biases which inhibit communication with people from different professional and experiential backgrounds are also other factors. Some of these critical factors can be overcome by creating small cross-organizational groups or partnerships, by increasing exposure to the technology, by rewarding joint work and by promoting people who are willing to champion technology transfer efforts within a corporation (Ehrlich, 1985)

Based on these former findings, this research tried to find out the main factors affecting TT in Ethiopian context and specifically in textile sector. The determinants of technology transfer in Ethiopian textile sector are access to financial capital,

periodic reinvestment of the company, size of the company, skill of technical staff, and the number of expats hired in the company. The following conceptual framework was developed from the source of Osabutey & Jin (2016).

Figure 1: Factors affecting technology transfer



Source: Osabutey & Jin (2016)

## 2.6 FDI and Technology transfer in Ethiopia

As of Mesele (2016), although the current FDI inflows in Ethiopia are increasing, it still remains the least FDI recipient. The World Bank report reveals that the current FDI net inflow of the country is 5.51%.

Figure 2: Ten years FDI inflow progress, (2006 to 2016) in Ethiopia



Source: tradingeconomics.com

As shown in the graph, the FDI flow of the country in 2016 almost tripled its number than in 2006. The increment at an increasing rate starting from 2014 to 2016 shows the investment environment in the country is improving and attracting FDI increasingly. The issues related to FDI, such as export performance, employment opportunity, technology transfer and so on, should be taken in to account when attempting to measure the FDI performance (OECD, 2014) Even though the extent of FDI inflow is increasing, however, the status of transfer of technology is still in question.

The FDRE Ministry of Science and Technology (MOST)'s mission is "to create a technology transfer framework that enables the building of national capabilities in technological learning, adaptation and utilization through searching, selecting and importing effective foreign technologies in manufacturing and service providing enterprises." The science, technology and innovation policy mentioned technology transfer as a first and foremost of the eleven critical policy issues. The core strategies to facilitate technology transfer are:

- *Import effective and appropriate foreign technologies and create capabilities of adaptation and utilization of these technologies in manufacturing and service providing enterprises;*
- *A system to search, select, adapt, utilize as well as dispose imported technologies should be established and implemented;*
- *Establish and implement a system to use foreign direct investment (FDI) and other ways of supporting technology transfer;*
- *Strengthen technology transfer among and between various manufacturing and service providing enterprises;*
- *Strengthen wide use of intellectual property, standards and other related information in support of technology transfer. (MOST, 2012)*

Unlike the policy concern, the government of Ethiopia doesn't give concern to the extraction of technology as expected. The Ethiopian herald gazette in its 7<sup>th</sup> March 2018 publication mentioned Director of Policy Research and Future Planning in Ministry of Science and Technology, Desta Abera, saying "technology transfer activities currently carried out in the country are not in line with the envisaged

technology demands of the development programs.” He added that “the level of qualified manpower capable of transferring foreign technology is low, and inadequate to facilitate the effective transfer of technology.” (allafrica.com, 2018)

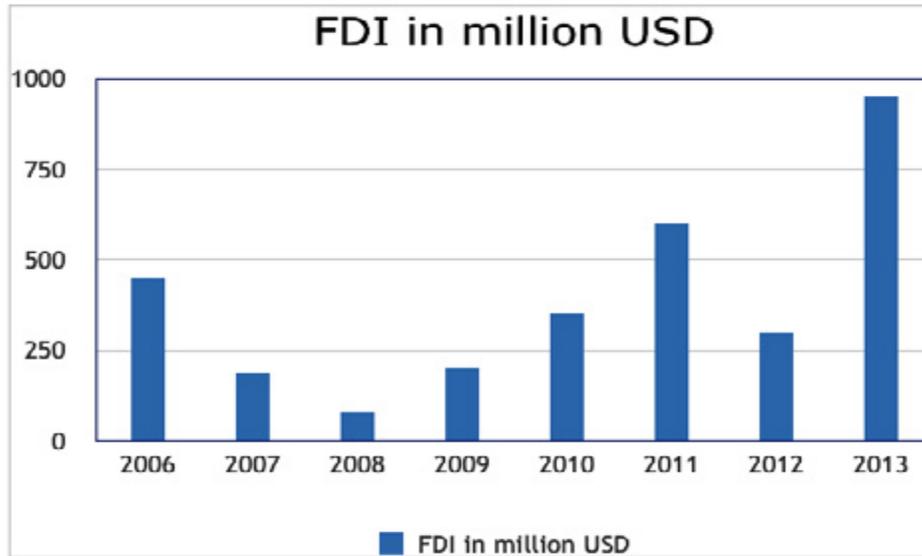
The government of Ethiopia also admitted that one of the reasons of poor progress of GTP1 in manufacturing sector’s contribution to the GDP is the poor technological capacity of the manufacturing industry and less extent of technology transfer. The national vision stated in GTP2 of the manufacturing sector wishes to see a competitive light manufacturing and grow heavy manufacturing sector on 2017. One of the prioritized sub sectors in the light manufacturing sector is the textile and garment sector. The evaluation of the first GTP shows the performance of the sub sector taken in different measures. Although the level of production, productivity and production capacity of the sub sector shows a slight growth, the production level hits 26.6% of its plan. Labor productivity is 50% less than the international standard, which is 12 min/person/T shirt. Its export performance is also 15% of its plan (MOI, 2014/15). This shows though it is one of the prioritized sub sectors, it still needs concern and the relevant bodies have assignments to do on it. The reasons behind this failure are discussed in the document and lack of technological capability is one of the reasons. This lack of technological capability can be backed up by the transfer of technology (MOI, 2014/15, Gebreyesus, 2013). This transfer of technology especially from MNCs to local companies helps grow the technological capability of the companies which in turn can increase the market competitiveness of the recipient companies.

## **2.7 Textile sector in Ethiopia**

Textile Products contributed 1.6% to the GDP (nominal) and accounted 12.4% of the Industrial output by value terms in 2010. For consecutive eight years, the export performance of the sector has shown an increasing trend, on average 50% per annum (ETIDI, 2014). But due to different reasons, its contribution to the economy is still in its low extent (Abebe, 2007). Kitaw & Matebu (2010) finds out that the textile and garment firms in Ethiopia are not in a position to compete in the international markets due to the problems such as: ineffective and inefficient management structures, high staff turnover (mainly due to low wages and unattractive working conditions), lack of marketing and market knowledge, unawareness of international requirements, lack of experience in dealing with international client, limited capability of own design and product development, low productivity and limited quality awareness as well as quality management structure. These reasons made the ambitious plan of the GOE to be unachievable yet (MOI, 2012)

The number of international large scale integrated textile and garment industries in the sub sector is increasing every year. The graph below shows the increasing trend of FDI in the sub sector.

Figure 3: FDI trend in textile sub sector in Ethiopia



Source: Pols (2016) UNECTAD's report

But the GOE mainly focuses on employment of its labor force only. And the most technical parts of the factories' works are deemed to be done by expatriates and the way they work and their knowledge are not exposed to the local workers. Then the local workers are supposed to focus only on routine works like sewing (Pols, 2016)

## 2.8 Empirical review

Some empirical studies shows that access to financial capital and the high level of reinvestment rate have a direct effect on technology transfer. Lemma, Kitaw and Gatew (2014) argues that the internal and external financial access have a direct effect on the transfer of technology from foreign to domestic companies. As of Ostabuley and Jin (2016), the access to financial capital to domestic companies and the financial related incentives to foreigner owned companies also have a direct effect on technology transfer. Jafarieh, 2001 also argues that the absorptive capacity of a

recipient country which can be expressed in terms of its internal and external financial capacity is one factor affecting technology transfer. Absorptive capacity can be increased through the development of its technological capability, which could not be affordable without financial access. The higher is the level of local technological capability in a country, the more this country will be able to absorb and assimilate imported technologies to its local conditions.

The existence of a well-educated and highly skilled labor force seems to be essential for a country to assimilate and absorb the foreign technologies and technical know-how more effectively. As the experiences of some South-East Asian first and second-tier newly industrialized countries (in particular South Korea and Taiwan) shows, it was massive investment in their people's education and their technological capability and closed the gap with technologically advanced country training and development of their human resources (Jafarieh, 2001). A need assessment study conducted in four sectors in Ethiopia, which has been studied in four sub sectors (metal, textile, cement and leather) shows most employees are not well qualified and trained. There are insignificant numbers of employees who hold BSC/BA, MSC/MA and PhD in all the sectors of the industry. The need for additional skill labor is high in almost all the sub-sectors and has the interest to hire qualified employees though they hardly made it. Particularly, all the sub-sectors are looking for science, engineering and technology qualified labor force, and yet, other field qualified labor forces are demanded. This in turn suggests shortage of well-trained experts and skill labors. It believes that the skill or qualification of technical experts is directly related to productivity, so the low level skill of the experts hired in these sub sectors directly affects their productivity and

effectiveness of technology transfer (STIC, 2015). Again, Ostabuley & Jin (2016) argue that the quality of technology and knowledge transfer depends on the quality of employees hired in the companies.

Large firms, having large capital and employees, have better capacity to absorb technology than medium size companies. Some empirical studies reveal that size of firms and technology transfer has direct relationship. Larger firms can afford specialized engineering departments, larger R&D budgets, more expensive external advice, more complete sources of information, and so on. So size of the firm has a direct effect on technology transfer. (Jafariieh, 2001)

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

This section gives clue on what methods of data collection, data types and analysis were used to collect and process the data.

#### **3.1. Description of the study area**

The study was conducted in domestic and foreigner owned textile companies located in Addis Ababa and around Finfine special zone.

#### **3.2. Sampling method and sample size**

There are quite a number of companies engaged in manufacturing sector in Ethiopia. Till March 2017, 2,894 local and FDI companies were registered and took their investment license from Ethiopian Investment Commission in different sectors. (EIC, unpublished data). Out of the total population, those companies who are engaged in the textile sub sector are framed out for this study, the total population of which is 293. Again, out of those 293 textile companies, those which are located in Addis Ababa and around are 55. This number is too small to take sample, so the whole target population was taken for the study.

The respondents of this research are local and foreign national owned textile companies. Each company was approached through one respondent who is a managerial level employee or owner of the company. This was done with an intention to get accurate information according to the research questions. Based on this, out of the sample size of 55 sample respondents, 51 respondents (92.7%) had filled and sent

back the questionnaire. Twenty seven of the companies are owned by domestic nationals and 24 are owned by foreign nationals.

### **3.3.Data collection method and data sources:**

To find out the current status of technology transfer in Ethiopia, primary data, collected using questionnaire and a secondary data by reviewing documents had been used. The questionnaire was used to collect data from the managerial level employees in both domestic and foreign owned textile and garment companies. The following indicators were included in the questionnaire.

- If trainings are given by foreign owned companies to domestic company employees: training is one way of transfer of technology. Most FDI companies give trainings to the new employees they hired before starting production. Some firms also give trainings to other companies' employees with or without payment.
- If there are products ordered from transferor by their own specifications and delivered back by the recipient company: most FDI companies have the capacity to produce the ordered amount. But sometimes, if the delivery time of the products is short, they prefer to give to other companies to produce the products with the same specification and after production, the FDI Company receive its products and deliver to the market. This helps domestic companies to be familiar with quality specifications of products which are demanded in the market.
- If there is machinery rental from foreign owned to domestic companies: this is about services the FDI companies giving to domestic companies as the domestic companies might not be able to have latest machineries to produce quality products. This helps

the domestic companies to produce quality products and compete in the market and finally own the new technology following their profitability.

- If experience sharing visits are done between foreign and domestic owned companies: this is helpful to domestic companies by generally introducing them the newly introduced and improved technologies.

The other method, document review was used to collect data from relevant government bodies. The relevant government bodies, which facilitate and control the transfer of technology, are expected to have measuring and controlling method. So the annual progress report of technology transfer documents in organizations and policies and regulations had been reviewed. Other related reports and assessments were also reviewed.

To address the second research question, the absorptive capacity of recipient companies, questions focusing on the following indicators were reviewed.

- The financial access of the domestic company: Access to financial capital is the most essential factor for a company to upgrade its capacity. This is directly related with the capacity to receive and practice new and improved technologies because most technologies are accompanied by costs and the company must be able to afford the costs. These costs may not be covered by the company's capacity, so governmental and private credit institutions must avail credit with little bureaucracy.
- Periodic reinvestment rate of its profit: Reinvestment rate is the rate of the money to be reinvested next year out of the amount of the company's net profit. The higher the reinvestment rate, the higher the financial capacity the company will have.

- The skill of technical unit and low level employees: This is directly related with the success of absorbing new technologies, that, once installed the new and improved technologies, it should be run by the employees. So the potential skill the employees have to adopt the new technologies must be taken into consideration. Based on this, it was tried to categorize the skilled, medium and low skilled employees. For this paper, “skilled” belongs to the college diploma and above holders, “medium” means above grade 8 complete and took training for the specific position and “low skilled” means daily laborer hired in the company.
- Size of the firm: It is obvious that large firms have large financial capacity and small companies have weak financial status. The size of a firm is characterized based on the financial capacity they have and the number of employees they hired. In Ethiopian context, the Federal Small and Medium Manufacturing Industry Development Agency Establishment Regulation No 373/2016 defines “medium manufacturing industry” as “an industry having a total capital, excluding building from Birr 1,500,001 to Birr 20,000,000 (One Million Five Hundred Thousand One Birr to Twenty Million Birr) in the manufacturing sector and engages from 31 to 100 workers including the owner, his family members and other employees.” Based on this, it is intended that firms having above the mentioned capital and number of employees are characterized as “large manufacturing industry.” We have characterized the status of the respondent companies based on this reference.
- Expatriates hired in relevant technical expertise: it is assumed that, if there are expats hired in a company, the local employees will have the chance to exercise new way of doing the same task in addition to the specific technology they are expected to

transfer to the local employees. This helps the company to customize new technologies and let the workers understand it easily which can reduce time and financial cost of the company which would be sacrificed at the time of introducing the new technologies.

The third question, factors affecting technology transfer, should be answered from both the company and the government point of views. The factors might rise from government or the company itself. Therefore, a primary data from the companies using questionnaire and a structured interview to government bodies had been used. It was tried to extract the answers using questions regarding:

- The finance access of the company
- Periodic reinvestment rate of its profit.
- The skill of technical unit and low level employees
- Size of the firm
- Number of expatriates hired in relevant technical expertise

#### **3.4. Data analysis method:**

The collected data was analyzed with the help of Statistical Package for Social Sciences (SPSS) software. Each objective was analyzed using the appropriate analysis method as expressed below.

To analyze the status of technology transfer between local and foreign owned textile companies, descriptive/ parametric statistics (mean, median, standard deviation) is used. The different indicators to show the status of TT are:

- The trainings given by foreign owned companies to domestic company employees
- The products ordered from transferor by their own specifications and delivered back by the recipient company
- Machinery rental from foreign owned to domestic companies.
- Experience sharing visits between foreign and domestic owned companies

Descriptive statistics was also used to analyze the absorptive capacity of recipients to receive technologies. The indicators to measure the absorptive capacity are:

- The finance access of the company
- Periodic reinvestment rate of its profit
- The skill of technical unit and low level employees
- Size of the firm
- Expatriates hired in relevant technical expertise.

A statistical/ inferential data analysis method, binary logistic regression model, was employed to test if the identified independent variables significantly affect the dependent variable, technology transfer. As technology transfer is a dichotomous dependent variable, having 1 and 0 answers, logit model was used to regress the data.

The dependent variable was defined as follows:

Outcome =1, technology was transferred and,

Outcome is = 0, technology was not transferred.

The model was formulated as follows;

$$\text{logit}(p) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_kX_k \quad (\text{Gujarati and Porter, Basic Econometrics})$$

Where:

$$P = b_0 + B_1X_1 + B_2X_2 + \dots$$

$p$  = the probability of transfer of technology

$b_0$  = the linear rate of change in the logit per unit change in the predictors.

The predictors or independent variables are;

$X_1$  = access to financial capital of the domestic company

$X_2$  = Periodic reinvestment rate of its profit.

$X_3$  = Skill of technical unit and low level employees

$X_4$  = Size of the firm

$X_5$  = Number of expatriates hired in relevant technical expertise

The logit transformation is defined as the logged odds:

$$\text{odds} = \frac{p}{1-p} = \frac{\text{probability of presence of characteristic}}{\text{probability of absence of characteristic}}$$

And

$$\text{logit}(p) = \ln\left(\frac{p}{1-p}\right)$$

Based on this: if  $p=1$ , technology is transferred

$P=0$ , technology is not transferred.

*Summary of variables*

Dependent variable: Technology transfer

<i>No</i>	<i>Variable</i>	<i>Variable name</i>	<i>Type of data</i>	<i>Expected effect</i>
	Access to financial capital	Capital	categorical	positive
	Periodic reinvestment rate of its profit.	Reinvestr	continuous	positive
	The skill of technical unit and low level employees	Skillr	categorical	positive
	Size of the firm	Sizer	categorical	positive
	Number of expatriates hired in relevant technical expertise	Expatr	continuous	positive

Table 1: Summary of variables

## **CHAPTER FOUR**

### **RESULT AND DISCUSSION**

#### **4.1.The current status of TT in Ethiopia**

The current status of the relationship of local and foreign owned companies regarding transfer of technology was assessed using the following indicators: the number of trainings given by foreign owned companies to domestic company employees, the amount of products ordered from transferor by their own specifications and delivered back by the recipient company, the number of machinery rental from foreign owned to domestic companies and the number of experience sharing visits made between foreign and domestic owned companies. Based on this the following information was found.

##### 4.1.1. Trainings given by FDI companies to domestic companies:

The different types of training an FDI company gave to domestic companies were very limited. Only 15.7% of the respondents gave and/or received trainings as shown in table 2. Some FDI companies argue that many employees leave their company after they took the training and got experienced of a given position. This means their company is contributing a trained manpower, which could be one way of technology or knowledge transfer. But this is beyond the scope of this study, as the study focuses on the extent of the direct technology transfer relationship between both domestic and foreign owned textile companies.

Table 2: Trainings given by FDI companies

Response	Number of respondents	Percent
No	43	84.3%
Yes	8	15.7%

#### 4.1.2. Number of production order given by FDI companies

The number of production orders included the orders given by FDI to domestic companies with required quality and specifications of a product/ products and finally delivered to customers. Such product order and delivery transactions give the domestic companies a chance to have knowledge about such product specifications. As shown in table 3, more than 96% of the respondents never gave/received production orders. This means not many FDI companies were interested to give orders to domestic companies and hence TT between local and foreign companies via product order and delivery with was insignificant.

Table 3: Production order given by FDI companies

Response	Number of respondents	Percent
No	49	96.1
Yes	2	3.9

#### 4.1.3. Rental of machineries and expats from FDI companies to domestic companies

The practice of rental of machineries and expatriates from foreign companies gives domestic companies an advantage of introducing new technologies easily. However, the practice of expatriate and machinery rental from the surveyed foreign owned to domestic companies was at zero level as shown in Table 4. Some respondents of domestic companies said such practice was done with other domestic companies due to cost related and other reasons. Such linkage between domestic companies is advantageous but latest technologies might not be introduced, as most local companies couldn't afford the cost of the new technologies. Although there is a chance to transfer technology between domestic companies, its level may not be as needed.

Table 4: Rental of machineries and expats from FDI companies to local companies

Response	Number of respondents	percent
No	51	100
Yes	0	0

#### 4.1.4. The number of experience sharing visits done by local companies to FDI companies

The number of experience sharing visits the domestic companies made to foreign owned companies was found to be on a relatively good condition when compared with the other indicators of status of TT. More than 30% of the respondents said that they had made experience sharing visits at different times.

Table 5: The number of experience sharing visits done by local companies to FDI

Response	Number of respondents	Percent
No	35	68.6
Yes	16	31.4

Overall, the above results show that, the current status of transfer of technology is weak. The number of experience sharing visits between local and foreign companies was relatively better than the other technology transfer relationship indicators (i.e. training, product order and delivery, and machinery and expatriate rental) between the companies.

The Ethiopian Science and Technology Information Center (STIC) technology capability assessment conducted in Ethiopian manufacturing sector in 2015 supports this study by showing that domestic companies have a poor external linkage with other domestic and foreign owned companies. The same study conducted in Tanzania also revealed that only few local firms' technologies are sourced from FDI; which means there is weak linkage between FDI and domestic companies in Tanzania too. (Biyamett & Mutambala, 2014).

One of the reasons for this weak performance of technology transfer is the absence of strong controlling and evaluation system of the level of TT in manufacturing sector as a whole. There are different types of privileges the GOE provides to attract FDI including income tax exemption to expats and FDI companies in an exchange of new

technology to be transferred to local companies and employees. As the government is incurring such costs to receive technology in return, it should make an evaluation of the status of technology transfer in relation to the costs foregone by the government for FDI incentives. But the interview made to concerning government officials and the proclamation and other documents reviewed shows that there is no any system to evaluate if technology is transferring or not. There is also no any data about the status of TT in manufacturing sector and in textile sector as well. Currently, a new technology transfer law is under development in MOST and is expected to include the system to evaluate and control the level of technology transferred in each sector.

The other reason could be the weak controlling and evaluation system of each host company. As of Ernest and Kim cited in Seckin (2015) technology is said to be transferred if and only if it is internalized and translated into the capabilities of the host company. If it is so, there should be progress controlling and evaluation system to measure if the newly adopted technology is going properly, and make appropriate decisions to solve problems. About 60% of the respondents have no technology transfer controlling system as shown in the table below.

Table 6: Technology transfer controlling and evaluation system

Response	Number of respondents	percent
No	16	59.2%
Yes	11	40.8%

The other issue is the documentation practice of changes in and after implementation process of new and improved technologies. The practices of documenting changes in implementation process of new and improved technologies is essential for companies to evaluate the pros and cons of the adopted technology, and gives clue to decide whether to continue or quit using the technology. About 63% of the respondent companies have no practice of documentation of changes in implementation process of new technology as shown in table 7. This lack of documentation practice may result a failure in choosing the appropriate type of technology, and the company could lose a chance to learn from failures and successes of initially adopted technology. This in turn could be a reason to the failure of installing new technology successfully.

Table 7: Documentation practice of changes in implementation process of new and improved technologies

Response	Number of respondents	percent
No	17	62.9%
Yes	10	37.1%

#### **4.2.Absorptive capacity**

New technology absorptive capacity of the surveyed domestic companies was measured in terms of access to financial capital, reinvestment rate, staff skill, size of the firm and the number of expatriate staff in relevant expertise. The following result was found.

#### 4.2.1. Access to financial capital

Access to financial capital the domestic companies have is very good as shown in table 8. More than 70% of the respondents said that there is medium access to financial capital and 18.5% of them believe that there is high access to financial capital from local financial institutions. There are public and private financial institutions who provide financial access to businesses engaged in manufacturing sector. Although it is exposed to some economic fluctuations, it could be controlled by the monetary policy of the government.

Table 8: Access to financial capital

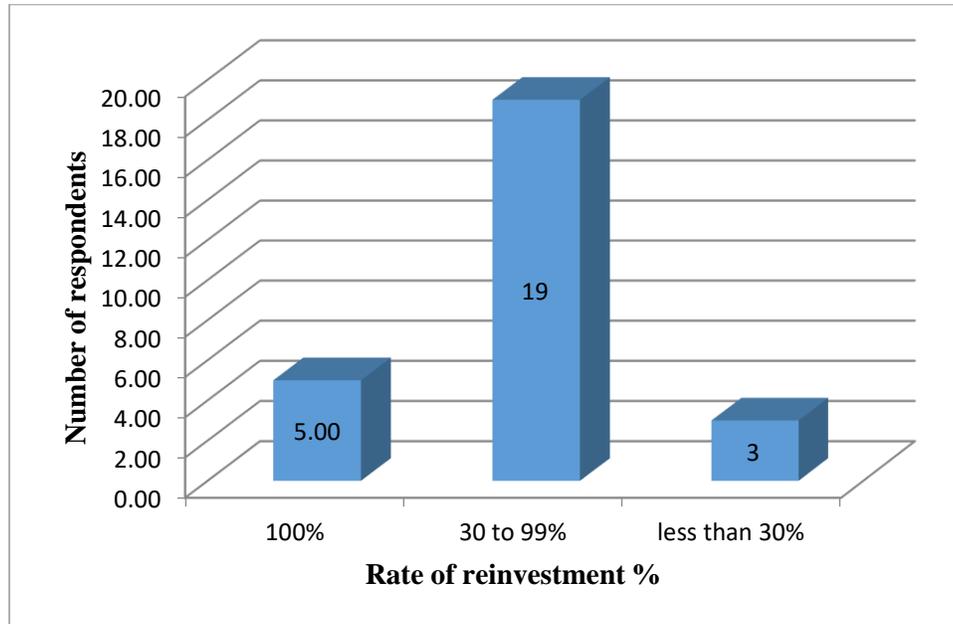
Response	Number of respondents	Percent
No access	3	11.1
Low	0	0
medium	19	70.4
High	5	18.5

#### 4.2.2. Reinvestment rate:

The other indicator of the absorptive capacity of the companies is the periodic reinvestment rate of its profit. Out of the total respondents, 29.6% have a reinvestment rate of 50% and above. In general, 81.5% of them have an average reinvestment rate of 30%-100%. This is because the owners want to upgrade the

technologies and size of their companies. The companies which have a reinvestment rate of 100% are medium scale firms, which are in a plan of expanding their production capacity, technological capability and market competitiveness. In contrast, companies with less share of reinvestment rate are large scale companies. Of course, this may not necessarily mean less amount of money, but less percentage of their profit. This percentage could be a large amount of money as their amount of total capital, turnover and profit is large.

Figure4: Average reinvestment rate of domestic companies' annual profit

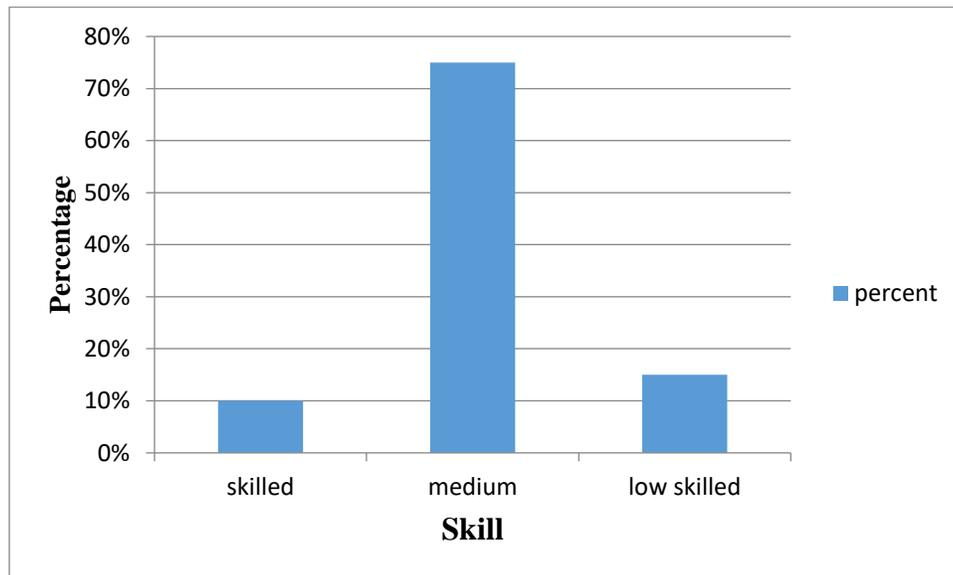


#### 4.2.3. Skill of technical staff

The skill of technical staff is also other indicator of the absorptive capacity of the companies. Figure 6 shows the average percentage of skilled, medium and low skilled employees in the domestic companies. Skilled (university graduates) employees are with an average of 10% out of the percentage of skilled employees hired in each

respondent company, medium (high school completed and trained for the specific position) with an average of 74.9% and low skilled (elementary complete and with no training) with an average of 15.1% in each company. The figure shows that most employees are medium skilled, which means they are with low educational background and skill, but have got short term training on their specific position. This low skill of the employees could make employees take long time to adapt to newer technologies. The findings obtained from a study conducted by the Ethiopian Science and Technology Information Center on the technological capability assessment of manufacturing sector in 2015 supports this research by showing that most employees have a poor educational status and only took a short time training of their job and this affects the absorptive capacity of companies.

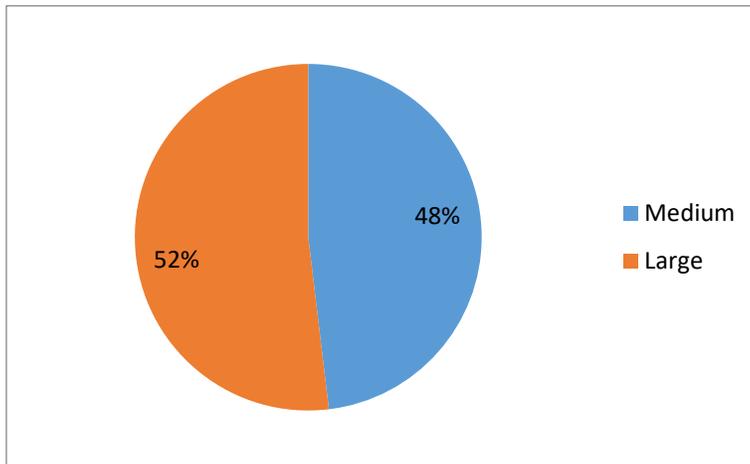
Figure 5: The average percentage of employees' skill in domestic companies



#### 4.2.4. Size of the firm

Size of the firm is also the other factor which is claimed to affect the absorptive capacity of recipient companies. The result shows, 13 domestic companies or 48.1% are medium scale<sup>1</sup> companies and the rest are large scale<sup>2</sup> companies. Most of the medium scale companies are engaged in garment industry only, as it needs less capital than the integrated textile companies. And the large scale companies have integrated textile industry including garment.

Figure 6: Firm size



#### 4.2.5. The number of expats hired in the company:

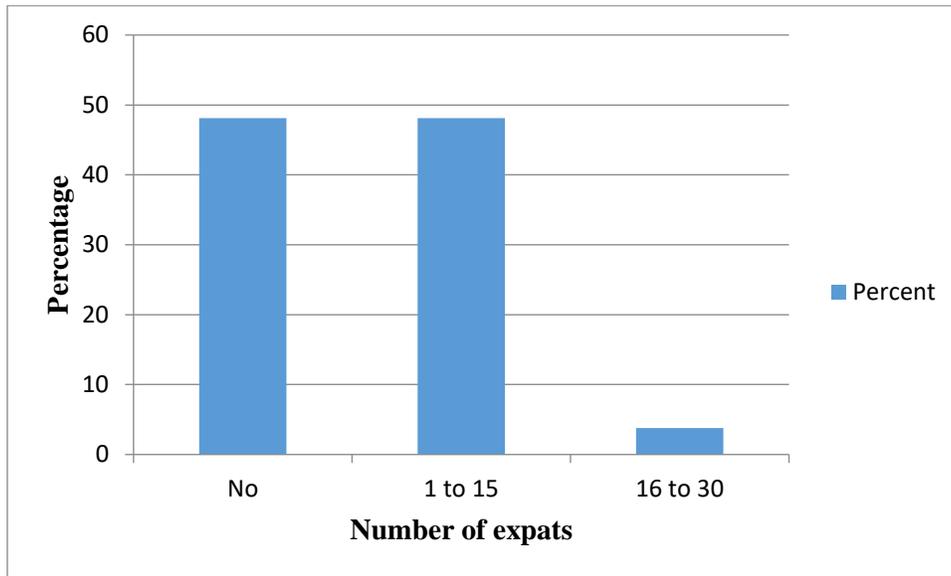
The number of expatriates hired in relevant technical expertise in each company is also assumed to have an influence on the readiness of the company to absorb technology. From the surveyed respondents, 13 or 48% have no expat hired in their company and the rest hired 1- 20 expats.

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<sup>1</sup>An industry having a total capital, excluding building from Birr 1,500,001 to Birr 20,000,000 in the manufacturing sector and engages from 31 to 100 workers including the owner, his family members and other employees."FSMMIDA Establishment Regulation No 373/2016

<sup>2</sup> An industry having capital and employees more than medium scale industry

Figure 7: Number of expats hired in relevant expertise



#### 4.3. Factors affecting technology transfer

A binomial logistic regression analysis was undertaken to determine the significant factors that influence technology transfer. The dependent variable used in the model was whether or not a company had adopted technology (1 if yes and 0 if not). The predictor variables were financial access, reinvestment rate, staff skill, company size, and use of expat staff. The following result has been found.

Table 9: Factors affecting technology transfer

	B	S.E.	Wald	df	Sig.	Exp(B)
Access to finance	2.688	1.276	4.435	1	.035	14.703
Reinvestment rate	1.978	1.077	3.374	1	.066	7.226
skill	-2.261	1.342	2.839	1	.092	.104
Firm size	-1.838	1.306	1.981	1	.159	.159
Number of expats	1.277	1.105	1.334	1	.248	3.586
Constant	-6.294	6.724	.876	1	.349	.002

Dependent variable: Technology Transfer

The regression result indicates that access to financial capital has a statistically significant impact at 5% level of significance. Reinvestment rate and skill of employees were found to have a significant impact at 10% level of significance.

The odds ratio of the predictor variables indicates that for a company that has access to capital, the likelihood for it to absorb technology increases by 14.7 times. For a 1% increase in the reinvestment rate, the likelihood of the company to absorb technology increases by 7.226 times. And for a 1% increase in skill of employees, the likelihood of the company to absorb technology decreases by 0.104 or 10.4%. This negative result of the variable skill of employees opposes the expected positive effect it would have on technology transfer. This could be a result of the small size of the

sample. One of the limitations of this study was that it was not able to consider the whole population, textile companies located in Ethiopia, due to shortage of time and budget. The other independent variables, i.e. size of the firm, and the expats hired in the company are found statistically insignificant.

#### **4.4. Summary of findings**

The main objective of this study was to find out what factors affect technology transfer between domestic and foreign owned textile companies in Addis Ababa and around. The 55 textile companies located around Addis Ababa were included in the study. The factors access to financial capital, periodic rate of reinvestment, skill of technical staff, size of the company and the expats hired in the company are considered. Access to financial capital and periodic reinvestment rate shows the internal and external financial capacity of domestic companies to absorb and implement new technologies. The skill of technical staff and the expatriates hired in the company are related with the employees' capacity to implement newly adopted technologies. The size of the company, based on its definition, shows the companies' financial and employee related capacity. It was assumed that all factors have positive effect on technology transfer. To test the hypothesis, binomial logistic regression model was used.

Based on this, the findings shows that access to financial capital and periodic reinvestment rate have positive impact and skill of technical staff has negative impact on technology transfer. The other factors, size of the firm and the expatriates hired in the companies are found statistically insignificant.

In addition to this, the study tried to assess the current status of technology transfer relationship between domestic and foreign owned textile companies and the absorptive capacity of domestic companies. It was finally found that the status of industry- industry linkage between domestic and foreign owned companies is weak and the absorptive capacity of domestic companies is also found weak. Though the government attempts to strengthen domestic companies to absorb and assimilate new technologies, its performance so far has been very low. This could be due to different reasons, such as the poor controlling system of the government organizations, the weak relationship between companies, the weak financial capacity of the domestic companies.

## CHAPTER FIVE

### CONCLUSION AND RECOMMENDATION

#### **5.1. Conclusion:**

It can be concluded that, the status of technology transfer between domestic and foreign owned textile and garment companies is very poor. Both government institutions and the companies themselves have no technology transfer evaluation system.

Access to financial capital from credit institutions and the size of the firms (amount of capital it holds) is moderate. The periodic reinvestment rate shows the companies' higher motivation to expand their production and productivity. But an assignment the government and the companies should take is to work on upgrading the skill of the employees. Most employees are short term trained workers by the companies themselves, with a very low knowledge and skill. Hiring some expats with relevant expertise may be advantageous for transfer of technology by domestic companies. But they should work on using the skill of the expats to their maximum and make sure that the expats are transferring technologies to domestic employees. It can be concluded that, the absorptive capacity of the domestic companies is weak, but there are also some good capabilities, such as the willingness of the companies to reinvest a large amount of their profit, and more than half of the surveyed domestic companies are large scale, (which is expressed in terms of the amount of capital it owns and the number of employees it hired).

All factors affecting technology transfer mentioned in this study were expected to have a direct effect to technology transfer. The study finally finds out that only access

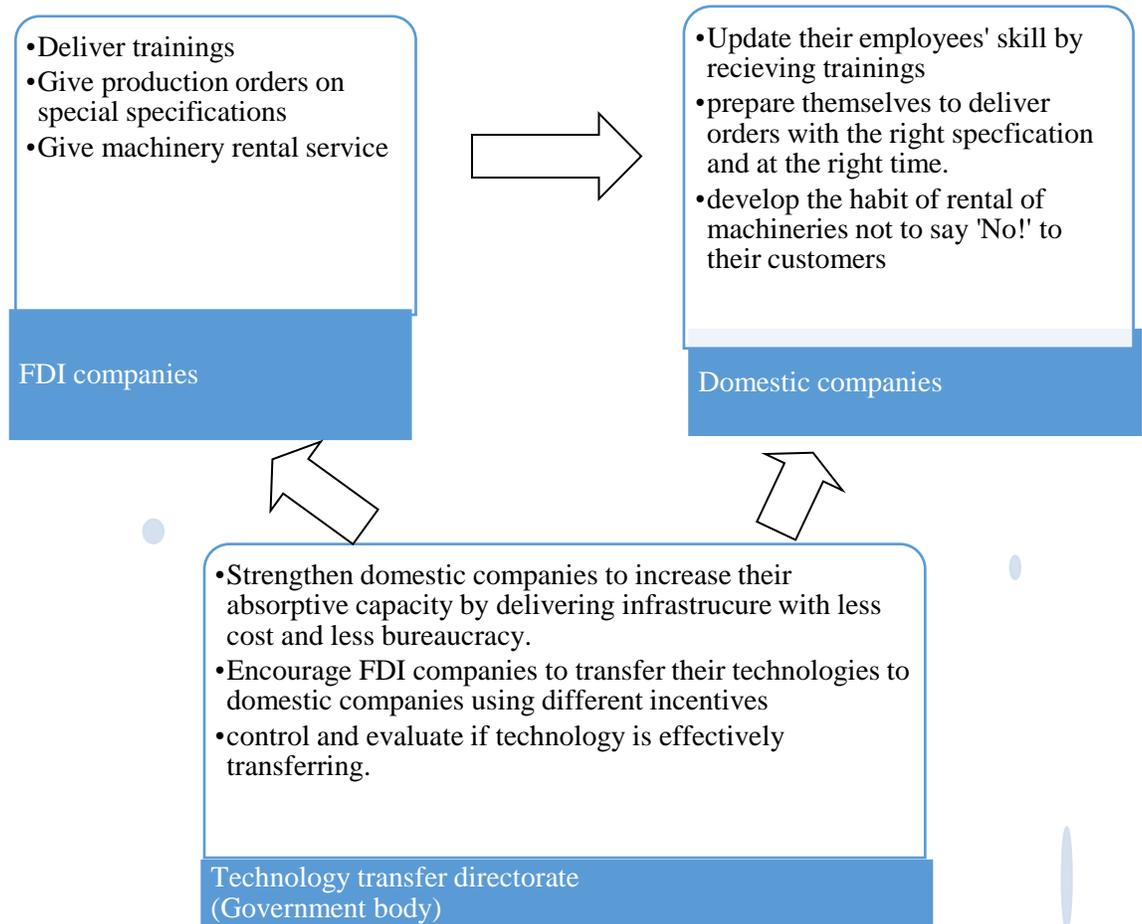
to financial capital and the rate of reinvestment has a direct effect and skill of employees has indirect effect. The rest predictors (size of the firm and number of expats hired) are statistically insignificant to the dependent variable.

## **5.2.Recommendation**

- a. Regarding the status of technology transfer between domestic and foreign owned textile and garment companies:

As the textile sub sector is expected to be one of the important components of the manufacturing sector of the country, the GOE should focus on the factors which facilitate the development of the sector. Technology transfer using different channels is the main catalyst to the development of the sector. So the government should work with its maximum effort to create a suitable environment to build a strong industry-industry linkage, develop a system which controls and evaluates the level of technology transfer and take actions on the problems affecting the transfer. This could be done by delivering different privileges to FDI companies and letting them transfer technologies to domestic companies. A network between the companies should be developed and controlling and evaluation tools should also be defined parallel to it. This should be done because it is essential to have information if technology is transferring, and how much technology is transferred every year. The following framework shows the recommended relationship of the companies and the regulatory body.

Figure 8: Technology transfer framework



b. Regarding the absorptive capacity of domestic companies:

The companies' capability to acquire, assimilate, transform and exploit new and improved technologies is the most essential part of TT. Domestic companies must build their capacity to absorb technology by strengthening their financial capacity by reinvesting large amount of their profit at the right time, provide different types of trainings and hiring a number of expats to upgrade the skill of their employees. If

companies build their internal capability by themselves, their exposure to economic and other fluctuations will be low. Then it is inevitable that introducing new technologies to such strong companies will be successful.

c. Regarding factors affecting TT

Access to financial capital, periodic reinvestment rate and skill of employees are found to significantly affecting the transfer of technology. These are normally the financial access it can possibly get from external sources, the financial capability of the company from its internal source, i.e. the annual profit, and the skill of employees. The assignment the government should take on this is to provide finance with very less bureaucracy and eligibility criteria and strengthen private financial institutions to widen the environment.

## References

- Diyamett, B. & Mutambla, M., 2015 “Foreign direct investment and local technological capabilities in least developed countries: some evidence from the Tanzanian manufacturing sector”, *African Journal of Science, Technology, Innovation and Development*, 401-414
- Ejiwale, J.A., July 2014, “Breaking Impediments to Technology Transfer through Foreign Trained Nationals,” Jackson State University, College of Science Engineering and Technology Department of Technology, USA, *International Journal of Business, Humanities and Technology*, Vol. 4, No. 4;
- FDRE MOI, 2014, “the second GTP of manufacturing sector”
- FDRE MOST, Feb 2012, “Science, technology and innovation policy”, Addis Ababa, Ethiopia
- Gebreeyesus M., June 2013, “Accelerating Industrial Development in Africa” Helsinki, Finland, Learning to Compete (L2C): UNU-WIDER,
- Haile, G., Srour, I. & Vivarelli, M, 17 May 2016, “Imported technology and manufacturing employment in Ethiopia,” *Eurasian Business Review*, 2017 7:1–23
- IMF, 2016, article IV consultation-press release; staff report; and statement by the executive director for the federal democratic republic of Ethiopia,
- JABBOUR, L. & Mucchielli J.L., November 2005, “technology transfer through vertical linkages” University of Paris I Panthéon-Sorbonne, *Journal of Applied Economics*, Vol X, No. 1, 115-136
- Jafarieh, H., July 2001, “Technology transfer to developing countries”, Technology, Information, Management and Economics Institute

- Ehrlich, K., October 1985, “factors affecting technology transfer”, Volume 17 Issue 2, Pages 20 - 24
- Kitaw D., & Matebu A., 2010, “Competitiveness for Ethiopian textile and garment industries: a way forward”, Addis Ababa University
- Kumara, S. Luthrab, S. Haleemc, A. Manglad, S.K. & Garge D., 2015, “Identification and evaluation of critical factors to technology transfer using AHP approach”, *international strategic management review* 3 24–42
- Lemma, Y. Kitaw, D. & Gatew G. April 2014, “The Impact of Foreign Direct Investment on technology transfer in the Ethiopian metal and Engineering Industries” *International journal of scientific & technology research*, volume 3, issue 4
- Mackenzie & Wackjman, 1985, “The social shaping of technology” Buckingham University
- Mansour, K.M. 2008 “FDI and International Technology Transfer to Egypt”, Cairo Egypt, *Economic Research Forum*, working paper 0317
- Mesele, R.T. June 2016, “Determinants of foreign direct investment in Ethiopia: time series analysis” Addis Ababa, Ethiopia, Indra Gandhi National Open University
- Naanaa, I.D. & Sellaouti, F. December 2013, “The Role of Foreign Presence in the Technology Transfer” *International Journal of Trade, Economics and Finance*, Vol. 4, No. 6
- OECD, 2014, “Regulatory environment for foreign direct investment: preliminary inventory for selected African countries,”

Osabulley, A.C, & Jin, Z. 2016, “Factors influencing technology and knowledge transfer: configurational recipes for sub Saharan Africa”, *Journal of Business Research*, 5390-5395

Osano, H.M. & Koine, P.W. 2016, “Role of foreign direct investment on technology transfer and economic growth in Kenya: a case of the energy sector,” *Journal of Innovation and Entrepreneurship*

Sheferaw, A. Apr 2017, “Productive capacity and economic growth in Ethiopia”, Department of Economic and Social Affairs, CDP Background Paper No. 34 S T/ESA /2017/CDP/34,

STIC, 2015, “Technological capability assessment in textile sector”, Addis Ababa, Ethiopia

UNECA, 2014, “Innovation and technology transfer for enhanced productivity and competitiveness in Africa” ; Seventh Joint Annual Meetings of the ECA Conference of African Ministers of Finance, Planning and Economic Development and AU Conference of Ministers of Economy and Finance, Abuja

UNCTAD, 2002, Investment and innovation policy review- Ethiopia, Geneva and New York

UNCTAD, 2017, “World Investment Report”

Wahab, S.A., Rose R.C. & Osman, S.W., January 2012, “Defining the concept of technology and technology transfer”, *international business research*, vol 5, No 1,

Zahra S. & George G., 2002, “Absorptive capacity: A review, reconceptualization, and extension.” *Academy of Management Review*

## Appendices

### Appendix A: questionnaires

#### Questionnaire 1

##### **To be filled by domestic textile and garment companies**

My name is Eyerusalem Seare, a post graduate student in Addis Ababa Science and Technology University, MBA in Industrial Management. This questionnaire is part of my thesis and is aimed for academic purpose only. My thesis title is “**Factors affecting technology transfer between local and foreign owned textile and garment industries.**”

Dear participants of this Questionnaire, as someone currently involved in this thesis, I would greatly appreciate a few minutes of your time to respond to the questionnaire. All information provided by you will be treated as strictly confidential. The questionnaire will only take 15 minutes to complete. Please fill it carefully and be a part of the solution of the problems regarding technology transfer in the country.

Your participation is very much appreciated and will allow us to focus on critical issues related to technology transfer between local and foreign owned textile companies.

Please tick inside the boxes for your answer.

##### **A. Demographic background**

1. Current position: Managerial  Non Managerial

2. Total experience in the position:

More than 10 years  10-5 years  5-1 years  less than 1 year

3. Years of service in the current company

More than 10 years  10-5 years  5-1 years  less than 1 year

**Company profile:**

1. Company name.....
2. Year of establishment .....
3. Main product types.....
4. Product Market (%) domestic market.....  
Export market.....

**A. Status of technology transfer:**

Method of technology transfer your company use to receive technology from foreign national owned companies

- Trainings received  
Yes  No
- Product orders received from foreign owned companies with their own specifications  
Yes  No
- Machineries and equipments rental  
Yes  No
- The number of experience sharing visits your company made to foreign owned companies  
Yes  No

**B. Absorptive capacity of domestic companies**

- Current capital.....
- Number of employees.....
  - Local .....
  - Expatriates in relevant technical expertise.....
- Skill of employees
  - Skilled (%) .....
  - Medium (%) .....
  - Low skilled (%) .....
- The percentage of periodic reinvestment rate from its profit.....
- Access to financial capital
 

High  medium  low  no access

**C. Factors affecting technology transfer**

questions		Strongly agree (5)	Agree (4)	Neutra 1 (3)	Disagr ee (2)	Strongly disagree (1)
1.1.	Access to financial capital					
1.2.	The average periodic reinvestment rate					
1.3.	Skill of employees					
1.4.	Size of the firm					

1.5.	The number of expats hired in a relevant technical expertise					
------	--	--	--	--	--	--

What other factors do you think affects the transfer of technology from foreign owned textile companies to locally owned textile companies?

.....

.....

**D. Other related questions**

- Do you believe technology is transferred?

Yes  No

- Does your company have a controlling and evaluation system of newly adopted technologies?

Yes  No

- Does your company have a habit of documenting implementation process of new technologies?

Yes  No

Questionnaire 2

**To be filled by foreign owned textile companies**

My name is Eyerusalem Seare, a post graduate student in Addis Ababa Science and Technology University, MBA in Industrial Management. This questionnaire is part of my thesis and is aimed for academic purpose only. My thesis title is “**Factors affecting technology transfer between local and foreign owned textile and garment industries.**”

Dear participants of this Questionnaire, as someone currently involved in this thesis, I would greatly appreciate a few minutes of your time to respond to the questionnaire. All information provided by you will be treated as strictly confidential. The questionnaire will only take 15 minutes to complete. Please fill it carefully and be a part of the solution of the problems regarding technology transfer in the country.

Your participation is very much appreciated and will allow us to focus on critical issues related to technology transfer between local and foreign owned textile companies.

Please tick inside the boxes for your answer.

**Demographic background**

4. Current position: Managerial  Non Managerial
5. Total experience in the position:  
More than 10 years  10-5 years  5-1 years  Less than 1 year
6. Years of service in the current company  
More than 10 years  10-5 years  5-1 years  Less than 1 year

**Company profile:**

- 5. Company name.....
- 6. Year of establishment .....
- 7. Main product types.....
- 8. Product Market (%) domestic market.....  
Export market.....

**a. Status of technology transfer:**

Method of technology transfer your company use to receive technology from foreign national owned companies

- Trainings given  
Yes  No
- Product orders given to domestic companies with specifications  
Yes  No
- Machineries and equipments rental  
Yes  No
- The number of experience sharing visits your company made by domestic owned companies  
Yes  No

**b. Absorptive capacity of domestic companies**

- Current capital.....
- Number of employees.....

- Local .....
- Expatriates in relevant technical expertise.....
- Skill of employees
  - Skilled (%) .....
  - Medium (%) .....
  - Low skilled (%) .....

**c. Factors affecting technology transfer**

questions		Strongly agree (5)	Agree (4)	Neutra l (3)	Disagr ee (2)	Strongly disagree (1)
1.6.	Access to financial capital					
1.7.	The average periodic reinvestment rate					
1.8.	Skill of employees					
1.9.	Size of the firm					
1.10.	The number of expats hired in a relevant technical expertise					

What other factors do you think affects the transfer of technology from foreign owned textile companies to locally owned textile companies?

.....  
.....

Structured interview

My name is Eyerusalem Seare. Thank you for giving me your time. This interview aims at searching “**The factors affecting technology transfer between local and foreign owned textile industries.**” i.e. my post graduate thesis. The purpose of this interview is to add the government points of views regarding the problems related with the transfer of technology between local and foreign owned textile companies to the research. All information provided by you will be treated as strictly confidential.

1. Name of the government organization: .....
2. position of the respondent: .....
3. The key missions of the organization.....
4. Is there an independent office which works at controlling and creating suitable environment for technology transfer?.....
5. If yes, at what level? .....
- Directorate level/ team level/ or other?.....
6. What key purposes does it have? .....
7. What are the main methods your organization uses to create technology transfer linkages between manufacturing companies? .....
8. How do you measure if technology is transferred or not? Is there any controlling system? .....
9. What is the extent of the progress of technology transfer reported each year? .....
10. Are there any incentives given to the transferor to motivate transfer their knowledge? If yes, mention.....

11. Is there any capacity building programs given to recipients (local firms) to be able to absorb technology? If yes mention.....
12. Are there any governmental and private stakeholders working with you organization? If yes, mention them? .....
13. Is your relationship strong enough to meet your plans?.....
14. What are the problems related with TT? .....
15. Do you think the government policies and strategies are suitable to motivate TT? .....
16. Is the structure of TT and development departments at each government sector organizations compatible? .....
17. What are the main factors affecting TT? .....
18. What should be done by the government to face the problems? .....

**Thank you so much!!!!**

## Appendix C: tables of result

### LOGISTIC REGRESSION

VARIABLES tt

/METHOD=ENTER finaccess reinvestr skill sizer expatr

/CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

### Logistic Regression

#### Notes

Output Created		19-OCT-2018 22:27:08
Comments		
	Data	C:\Users\user\Documents\analysis\jerry anal.sav
	Active Dataset	DataSet1
Input	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	51
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing

Syntax		LOGISTIC REGRESSION VARIABLES tt  /METHOD=ENTER finaccess reinvestr skill sizer expatr  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).
Resources	Processor Time	00:00:00.05
	Elapsed Time	00:00:00.05

[DataSet1] C:\Users\user\Documents\analysis\jerry anal.sav

**Case Processing Summary**

Unweighted Cases <sup>a</sup>	N	Percent
Included in Analysis	27	52.9
Selected Cases Missing Cases	24	47.1
Total	51	100.0
Unselected Cases	0	.0
Total	51	100.0

a. If weight is in effect, see classification table for the total number of cases.

**Dependent Variable Encoding**

Original Value	Internal Value
technology is not transferred	0
technology is transferred	1

**Block 0: Beginning Block**

**Classification Table<sup>a,b</sup>**

Observed		Predicted	
		technology transfer	
		technology is not transferred	technology is transferred
Step 0	technology is not transferred	0	10
	technology is transferred	0	17
Overall Percentage			

**Classification Table<sup>a,b</sup>**

Observed		Predicted
		Percentage Correct
Step 0	technology is not transferred	.0
	technology is transferred	100.0
Overall Percentage		63.0

a. Constant is included in the model.

b. The cut value is .500

**Variables in the Equation**

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 0 Constant	.531	.399	1.773	1	.183	1.700

**Variables not in the Equation**

	Score	df	Sig.
finaccess	5.713	1	.017
reinvestr	2.409	1	.121
Variables skill	2.552	1	.110
sizer	2.256	1	.133
expatr	.150	1	.699
Overall Statistics	12.087	5	.034

**Block 1: Method = Enter**

**Omnibus Tests of Model Coefficients**

	Chi-square	df	Sig.
Step	17.087	5	.004
Step 1 Block	17.087	5	.004
Model	17.087	5	.004

**Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	18.508 <sup>a</sup>	.469	.640

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

**Classification Table<sup>a</sup>**

Observed		Predicted	
		technology transfer	
		technology is not transferred	technology is transferred
Step 1	technology is not transferred	8	2
	technology is transferred	2	15
Overall Percentage			

**Classification Table<sup>a</sup>**

Observed		Predicted
		Percentage Correct
Step 1	technology is not transferred	80.0
	technology is transferred	88.2

a. The cut value is .500

**Variables in the Equation**

	B	S.E.	Wald	df	Sig.	Exp(B)
finaccess	2.688	1.276	4.435	1	.035	14.703
reinvestr	1.978	1.077	3.374	1	.066	7.226
skill	-2.261	1.342	2.839	1	.092	.104
sizer	-1.838	1.306	1.981	1	.159	.159
expatr	1.277	1.105	1.334	1	.248	3.586
Constant	-6.294	6.724	.876	1	.349	.002

a. Variable(s) entered on step 1: finaccess, reinvestr, skill, sizer, expatr.

## **Biography of the author**

### **Personal Profile**

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Name: Eyerusalem Seare Abrha

Sex: Female

Status : Married and have two kids

Nationality: Ethiopian

Current Location: Addis Ababa

Current Position: Manufacturing incentive expert in FDRE Ministry of Industry

Contact Address : Phone 0913799569

E-mail [jerusalem.mariam@gmail.com](mailto:jerusalem.mariam@gmail.com)

### **Educational Background**

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2016-to Now : MA Student in Project Management at AA University School of Commerce.

2016-to Now : MBA Student in Industrial Management at AA Science & T. University.

2011: BSc. Degree in Natural Resource Economics and Management from Mekelle University.

### **Work Experience**

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2015 till now: The author is currently working at FDRE Ministry of Industry since 2015 as manufacturing export incentive expert.

2014 to 2015: market development expert in Addis Ababa micro and small enterprises development office.