ADDIS ABABA UNIVERSITY

Addis Ababa Institute of Technology (AAiT)

School of Mechanical & Industrial Engineering

Industrial Engineering program

Status and prospects of Knowledge and technology transfer in Bole Lemi Industry Park

By: Derebe Alehegn

A Thesis Submitted to Addis Ababa Institute of Technology (AAiT), as a Partial Fulfillment for the Award of the Degree of Master of Science in Industrial Engineering

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This is to certify that the thesis prepared by Mr. Derebe Alehegn entitled as "status and prospects of knowledge and technology transfer in Ethiopian industrial parks; A case of Bole Lemi Industrial Park" and submitted in partial fulfilment of the requirement for degree of "Master of Science in Industrial Engineering" complies with the regulation of the university and meets the accepted standards with respect to originality and quality.

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Abstract

Knowledge and technology is taken as a driver of economic growth and welfare for every country. It can be owned mainly in two ways; i.e. developed internally or transferred from external source. Developed countries use their own developed knowledge and technology whereas most developing countries invest on transferring the developed knowledge and technology through different mechanisms.

Ethiopia, as a developing nation, has been investing on technological innovation and it is supported with foreign direct investment. Industrial parks are treated as the center of technology transfer while generating foreign currency and creating job opportunity. To achieve this via industrial parks, the government plans to transfer knowledge & technology by recruiting trainers for three year contract. It is four years since started, but the required level of knowledge & technology transfer is not achieved yet by two main cases, as per the information from EiC & park management. One, expats are asking contract renewal referring insufficient achievement of planed training & two, trained labors leave the company due to dissatisfactory cases.

This thesis work addressed problems associated with knowledge and technology transfer from home country (foreign investors) to host country (Ethiopia) via industrial parks established for this and other purposes; considering Bole Lemi Industrial Park as a case. The objective of the research is to develop an effective conceptual framework that integrate the methods, actors and actions of knowledge and technology transfer by minimizing factors in industrial parks.

Both quantitative and qualitative data collection tools and analysis methods were used in the study. Tabular, graphic & descriptive analysis is implemented to explain the data and to show the meanings in result. Also, a conceptual framework is developed for integration of three determinants of knowledge and technology transfer: methods, actors and actions; which are identified from the literature gap.

At the last part of this research, conclusion is made based on the discussion and findings and possible recommendations is forwarded to the responsible bodies in the government and private sector.

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Abbreviations

K&T	knowledge and technology
KTT	knowledge and technology transfer
TTO	technology transfer offices
ITT	international technology transfer
FDI	foreign direct investment
UNIDO	United nation industrial development organization
RDPS	research and development planning summary
R&D	research and development
PASDEP	plan for accelerated and sustained development to end poverty,
ADLI	agricultural development lead industrialization
GTP	and the Growth and Transformation Plan
GDP	gross domestic product
IPCC	Intergovernmental Panel on Climate Change
MNCs	multinationals companies
UNICATD	United Nations conference on trade and development
DST	Department of Science and Technology
TVET	Technical and vocational education and training
STI	Science, technology and innovation
FDRE	Federal democratic republic of Ethiopia
IPR	Intellectual property right
NGO	None governmental organization
TIFAC	Technology Information, Forecasting and Assessment Council
IPDC	industrial parks Development Corporation

EiC	Ethiopian investment commission
MEST	ministry of education science and technology
BLIP	Bole Lemi Industry Park
HRM	human resource management
ILO	International Labor Organization
CETU	Confederation of Trade Unions
LIDI	leather industries development institution
MIDI	metal industries development institution
TIDI	textile industries development institutions

Chapter One

1.1. Background of the study

Knowledge and technology are taken as a driver of economic growth and welfare for every country; regardless of the level of development (UNCTAD, 2010). Few developed countries can create knowledge and technology and are able to lead the economy as well as bridging the technology gap between rich and poor countries. On the other hand, most low-income countries can only adopt and adapt knowledge and technology from abroad. Therefore, the transfer of knowledge and technology (TOKT/KTT) is mandatory to support their national economy by technology.

An overview of policies and practices conducted in Africa states that African countries are reforming their policies, legislations and institutional arrangements so as to attract foreign direct investment (FDI). They are thinking that by having greater FDI opportunities, knowledge and technology can be gained. But, FDI flows to Africa have expanded only marginally and are still at levels behind those of other developing country regions. This is mainly because of weak domestic R&D capability (Mugabe, 2013). Knowledge and technology transfer can be conducted in between many parts as like between educational institutions and business, between research organizations and manufacturing, between similar processing companies, between government and privates, between governmental countries, and so on. Private sectors are mostly benefited from institutional researches to support their production and to develop new products or process (Hussinger, 2013).

Knowledge and technology transfer can be done in different ways between universities and firms. These are publications, participation in conference professional networks and boards, mobility of people, other informal contacts/networks, cooperation in research and development (R&D), sharing of facilities, cooperation in education, contract research and advisement, intellectual property rights, spin-offs and entrepreneurship (Sart, 2012). As per Campbell (2007), five main goals of KTT were introduced as a role is to contribute to the economy, to facilitate research uptake for the public good, to develop mutual beneficial ties with industry, to motivate and retain academic staff & to increase the income of the universities.

Sometimes, KTT is interpreted as "where organizations try to recreate and complex, causally ambiguous set of routines in a new setting" (Lee, 2010). Knowledge and technology has been gained a vital factor of competitiveness for world economy including Ethiopia (Araujo, 2014). Its necessity in every business environment has been presented & discussed in (UNIDO, 2016) and gaining of knowledge & technology can be processed in different ways.

However, knowledge and technology transfer remains a thematic area for further investigation in countries which are in plan to change their economic status and rate of development. Technology and innovation comes to be an important competing factor for industrial development in developing countries. Due to this, based on the need of governments and different organization or on the will of individuals, discussions, analysis and findings are in need still. With the right capabilities, technology-driven structural change expands the modern, formal industrial sector and industry-related services, absorbing labor from the pool of underemployed workers in agriculture or informal services (UNIDO, 2016).

Ethiopian government is investing on technological innovation economy, especially on industrial innovation. In its Growth and Transformation Plan (GTP), the government of Ethiopia has already highlighted industrialization as a key to sustaining growth and as an impetus for economic structural transformation. In this respect, it is clear that notwithstanding remarkable economic growth that Ethiopia achieved in the past decade. The key constraints for industrialization and transformation are the lack of capital, foreign exchange, and knowledge. Specific constraints related to the manufacturing sector include those related to land acquisition, custom and logistic services and low capacity and absence of coordinated effort in the development and provision of infrastructure and public services (Bayrau, 2017).

Considering the gaps in knowledge and technology transfer raised by governmental and private studies and reports (FDRE, National Science, Technology and Innovation Policy, 2010), this paper is trying to assess the trend and status of knowledge and technology transfer in Bole Lemi industrial park. The paper is organized under six parts.

The first chapter introduces the issue; i.e. knowledge and technology transfer; from the aspect of global and national experience and tries to converge and custom to the national concern. The problem is defined and the objective of this research is driven from the nature of the problem by

raising research questions which can help to keep the track of the research by indicating the possible solution. In addition, the significance and limitation of the work is mentioned in this chapter.

In the second chapter, the detail of literature survey is discussed from different view of knowledge and technology transfer. The definition of knowledge and technology, types of knowledge and technology, sources and channels of knowledge and technology transfer, the potential factors and policy of knowledge and technology transfer are discussed in detail so as to identify the specific gap in the field. The history and nature of industrial parks in abroad and its behavior in Ethiopia is presented.

The third chapter tells us about methodology of the research which briefs the way of approaches to collect data and to analyze the information so as to conclude over the issue raised in the first chapter of the research. The tools and methods used in the process of the research are cleared. Places and groups addressed to gather information and to discuss with about the problem are mentioned in this chapter.

The next and 4th part of this paper is about result and discussion of the research. It presents all the gathered information from each responsible bodies and discusses over the data so as to come up with the next right sight of action over the problems observed in the area. Existing status of knowledge and technology transfer in Bole Lemi Industrial Park, associated factors, the responsible bodies, the methods used and actions performed to transfer knowledge and technology in the industrial park are assessed. The presence and/ or absence of different systems which are considered as a means of knowledge and technology transfer are questioned and explained along with their importance and role in transferring knowledge and technology.

The fifth chapter is about formulating the recommended conceptual frameworks to integrate the three critical determinants of knowledge and technology transfer named as methods, actors and actions. This chapter contains the detail description of these conceptual frameworks and the guidelines for the implementation of the framework.

The last but not the least chapter in this paper tries to conclude the study from the view of problems raised, methodologies used and the findings formulated by the research. Far apart, this chapter

forwards the points which are assumed to be solutions as a recommendation for effective knowledge and technology transfer by eliminating or minimizing the possible barriers in the process.

1.2. Statement of the Problem

It convinces the majority that knowledge and technology is an axis at which all the human beings are computing on. Specifically, it limits the level of productivity in manufacturing industries. Now, the concern is "how knowledge and technology is being benchmarked and transferred between transferors and transferees, so that it would be usable and effective afterwards.

Bole Lemi Industry Park, which is assumed and built as to be the center of knowledge and technology transfer, have had shortcomings in the field this day. Knowledge & technology transfer via industrial parks is already proclaimed by the government aside of enhancing foreign currency & job opportunity. But, from the survey over the existence of the problem, it is understood that the park is utilizing its capacity only to boost the production volume and to meet the export market need of investors. It was planned to replace local experts in three years via Training contract with foreign expats to transfer knowledge & technology. But, most expats requests contract renewal for additional three years referring unsuccessful accomplishment. Due to this, knowledge & technology transfer is found to be ineffective yet (Personal interview; Bole Lemi industry Park management & EiC office; November 18-25-2018/19).

On the other hand, there is a significant labor movement in the industry park due to different cases related to the working environment. Addis fortune has made a report on the reasons of this occasion across the companies in the park & Bole Lemi Industry Park as a whole (Fortune, 2018). But, this labor movement is not utilized by the government as a method of transferring knowledge & technology. Most employees leaving the park are not located properly in other local industries, so that it is takes as resource dissipation. Because, other countries use labor movement as one method of knowledge & technology transfer deliberately in their policy & strategy.

Even though works are done so far over knowledge and technology transfer, still there is a problem of transferring knowledge and technology in a countable manner, so that Ethiopian can manage technological activities to sustain the technology itself as an economy beyond periodic usage.

So now in this paper, additional effort is put through and concerning issues are raised for discussion to find well working key to open the door of knowledge and technology transfer method so that industrial parks will perform the expected task as per the need of the country in the field.

1.3. Research questions

1). what is the existing status of knowledge and technology transfer in Bole Lemi Industry Park?

2). what are the major success factors that influence the process of knowledge and technology transfer in Bole Lemi Industry Park?

3). How does knowledge and technology is expected to be transferred successfully in Bole Lemi Industrial Park?

1.4. Objectives of the study

1.4.1. General objective: -

The general objective of this study is to investigate the status & develop conceptual framework of knowledge and technology transfer in Bole Lemi Industry Park.

1.4.2. Specific objectives:-

- Review of global and national works on knowledge and technology transfer.
- Identifying most common Channels & methods of knowledge and technology transfer.
- Identifying potential factors hindering knowledge and technology transfer.
- Assessing the existing status of knowledge and technology transfer in Bole Lemi Industry Park.
- Identifying powerful responsible bodies for knowledge and technology transfer activities in Bole Lemi Industrial Park.
- Adapt best sweated framework of knowledge and technology transfer for Bole Lemi Industry Park from a review and analysis.

1.5. Significance and justification of the study/contribution

Most countries which undergo economic development programs focuses on technological investment as a tool to derive economic growth. For a long period of time since 1950, foreign investment and joint venture have been treated as part of policy in designing economic development goal of developed and developing countries. Ethiopia, as a country seeing to

economic change in the coming years, articulates a policy and is trying to cop up the difficulties in accomplishing the policy.

Low level of technological development is taken as a major constraint on tackling national poverty. Due to this, poverty eradication still remains a point of concern for the Ethiopian government (Beer, 2014). Even though policy makers, business owners and academicians do a lot on this, concept and mechanism of knowledge and technology transfer is still a controversial issue (lemma, 2011). Academicians agreed that the system of KTT is not effective yet (Renault, 2008).

So, this work contributes to minimize the above problem and supports Country strategic plan directly or indirectly by indicating better mechanism of knowledge and technology transfer in industrial parks. The study concerns on investigating the way of transferring knowledge and technology between countries which are under investment relation and benchmarking the best sweated means for Ethiopia. Afterwards, since a company is to mean all the system including man power, the solution is expected to be implementable to transfer knowledge and technology between foreign and Ethiopian companies.

1.6. Scope limitation and challenges of the work

1.6.1. Scope

This work is purposely designed for Bole Lemi Industrial park, in which after completion, it is expected to be implementable in Ethiopian industrial parks as a whole regarding knowledge and technology transfer. The focus of the research is how to own knowledge and technology that exists in Bole Lemi Industrial park; rather not about the production process or other else. The final goal of the study is to find an appropriate and implementable conceptual framework that enables Ethiopia to spillover knowledge and technology from foreign investment in Bole Lemi Industrial park.

1.6.2. Challenges

Unfortunately, there were exist personal issues which lead to discomfort and takes away the focus to investigate the problem and follow the cases seriously in time. Beyond this, collecting data and holding a discussion with company owners and higher officials concerning the issue was time

costly because of unwillingness of most of the foreign investors and elongation of appointments to contact higher officials. In addition, questionnaire was designed to assess the existing status of knowledge and technology transfer in Bole Lemi Industry Park and corresponding organizations, but most of the questionnaires didn't returned back due to the carelessness of the respondents who were given with the questionnaire. As a result, the questionnaire collected was not found to be enough for full quantitative analysis and part of these were used to show gaps in terms of percent and graphs. Instead, the responses from the interviews and focus group discussion is used to analyze all the problem feature in the research. For that matter, the research is mainly qualitative.

Chapter Two

Literature review

2.1. Introduction

In this chapter, the researcher starts by defining terms and terminologies of the issue under study. Knowledge (as implicit & explicit) and technology (as hard & soft skill) are defined separately and together followed by the transfer referring works done before.

In the next part of literature; types of knowledge & technology transfer (formal & informal), channels of knowledge & technology transfer, knowledge & technology transfer environments, role, source (internal & external), factors and policy of knowledge & technology transfer are surveyed with proper flow and arrangement of ideas to brief the readers about the issue so far. Experience of nations in knowledge & technology transfer activity (especially on policy, FDI & R&D) which are involved in Bole Lemi industry park investment is also referred in slight to relate the study with the reality and to approach the problem with addressable objective & methodology. Nature and origin of industrial parks, their purpose & significance is skimmed in abroad & nationally. At the end of this part, review of frameworks and theoretical models of knowledge & technology transfer is conducted to come up with better coordination of elements of KTT.

By doing so, the study gap is identified as untouched point and formulated as integrating the three determinants of knowledge & technology transfer in a controlled manner. So, the general objective is designed to fill this gap fully/partially based on the answers for research questions. By then, it contributes to simplify the problem stated in this study.

2.2. Definition

To start with, terms knowledge and technology are not necessarily the same in their definition and concepts. They might be related in the way that both enable organizations to integrate activities and to continue forward in their business (Lee, 2010). But, knowledge by itself doesn't constitute technology because, the replication and imitation of knowledge for a given productive process is not easy.

2.2.1. Knowledge

The term knowledge is different for different peoples and organizations. It can be defined as of what we have and we may believe that it is the only power to sustain this world. But academics and researchers explain it from other view. According to Ganesh (2000), knowledge is an organized combination of ideas, rule, procedure and information. Knowledge is a firm's most valuable resource because it embodies intangible assets, routines, and creative processes that are difficult to imitate (Odigie, 2006).

Scholars put different definitions and explanation about the term knowledge.

> *"Knowledge arising from businesses takes many forms. It can be manifested in documents and publications such as books or scientific articles published by organization's employees as well as within documents underlying intellectual property titles, including patent, utility models and design rights. Knowledge can also be embedded in objects such as materials or machinery. In the beginning, however, knowledge is the know-how of the employees and collaborators, which they have acquired through training, study or experience."* (helpdesk, 2013).

> ***"****Knowledge has emerged as the most strategically-significant resource of the firm', and that can lead to the development of a sustainable competitive advantage"* (Khan, 2011).

A study entitled as "needs and methods of knowledge and technology transfer" categorizes knowledge in two main groups; explicit and tacit.

2.2.1.1. Explicit Knowledge

Various manuals: construction, drainage, right of way, environmental, plans and specifications, design status reports. laboratory testing procedures, site manager software, state statutes and regulations, field books, lessons-learned databases, property records, cost data, change orders, survey equipment operation instructions, training materials, regional maintenance station profiles, snow and ice control plans, deferred maintenance inventories

2.2.1.2. Tacit Knowledge

Maintenance and operations processes: crack sealing, equipment operation, tire chain installation, various review processes: materials, claims, permits, subdivisions, personnel matters: supervising, making the job enjoyable, conveying expectations, job duty clarification, project manager roles and responsibilities, team building, effective relations between project and functional groups, priority setting, dealing with contractors, budget process, dealing with the public; community involvement processes, dealing with other agencies, use of accounting system, project lessons learned, design nuances, knowing where to go and whom to talk to in order to gather information, have questions answered, report preparation and other documents (Perkins, 2012).

2.2.2. Technology

Actually, defining the term "technology" has not found to be easy as per different scholars argument. Due to this nature of technology, researchers have been discussed the definition from different perspectives as is widely explained in previous literatures. Technology consist two primary components (Wahab, 2012).

1) A physical component which comprises of items such as products, tooling, equipment's, blueprints, techniques, and processes; and

2) The informational component which consists of know-how in management, marketing, production, quality control, reliability, skilled labor and functional areas.

Technology transfer can also be defined as:

> *"The process of movement or transfer of information, technical know-how, and people among corporate technical functions such as R&D, engineering, manufacturing and nontechnical functions such as sales in order to yield innovative products and services that meet corporate business goals and fulfill customer needs"* (Mojaveri, 2011).

By referring Intergovernmental Panel on Climate Change (IPCC), Stephen Seres defines technology transfer as:-

> *"a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/education institutions".*

Movement of knowledge among firms or sectors located in different countries refers to the process of learning to understand, utilize and replicate the technology including the capacity to choose and adapt it to local conditions, integrate it with indigenous technologies. Technology transfer can be seen further as is a comprehensive term covering mechanisms for shifting information across borders and its effective diffusion into recipient economies (Maskus, 2004).

Technology transfer has been defined closely as the cross-border flows of both physical goods and knowledge, be it tacit or formal (UNCTAD, 2010). David (2002) explains technology transfer as is a transaction or a process through which technological knowhow is transferred normally between businesses or agencies representing businesses.

Technology exists mainly in two forms: tacit and explicit or hard and soft skill technology. The detail of the nature/ type of these classification can be represented in the following figure as per the elaboration of (Gatew, 2011).

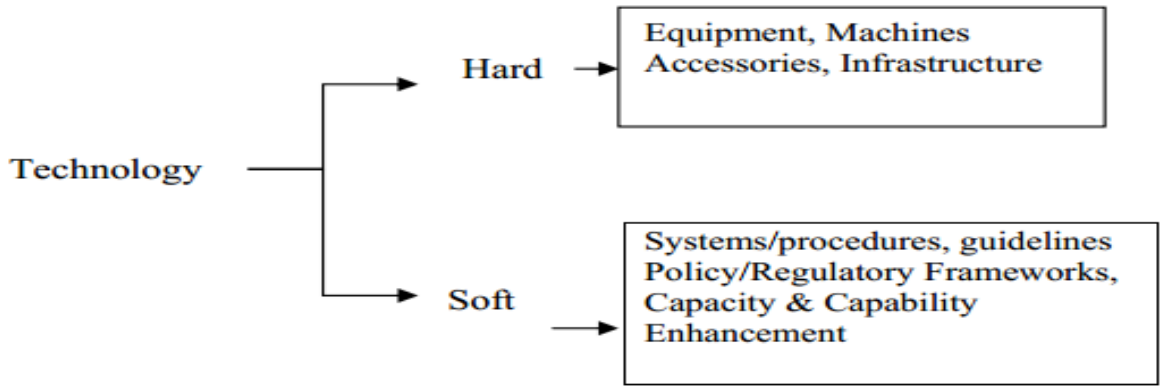

Figure 2. 1. Typology of Technology: Source (Gatew, 2011).

2.3. Knowledge and technology transfer

Even though peoples can see it differently, in common, knowledge transfer is a continual flow of knowledge that led to innovation for economic development; whereas, technology transfer is

> *"…the process of skill transferring, knowledge, technologies, methods of manufacturing, samples of manufacturing and facilities among governments and other institutions to ensure that scientific and technological developments are accessible to a wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials or services."* (Habib, 2016).

There are five categories of transaction as to mean technology transfer. These are:-

1). The assignment, sale and licensing of all forms of industrial property, except for trademarks, service marks and trade names when they are not part of technology transfer transactions;

2). The provision of know-how and technical expertise in the form of feasibility studies, plans, diagrams, models, instructions, guides, formulae, basic or detailed engineering designs, specifications and equipment for training, services involving technical advisory and managerial personnel, and personnel training;

3). The provision of technological knowledge necessary for the installation, operation and functioning of plant and equipment, and turnkey projects;

4). The provision of technological knowledge necessary to acquire, install and use machinery, equipment, intermediate goods and/or raw materials which have been acquired by purchase, lease or other means;

5). The provision of technological contents of industrial and technical cooperation arrangements (UNCTAD, 2013).

Knowledge transfer is a key tool of technology transfer, technology cannot be transfer if there are no knowledge of what to be transferred. Therefore, knowledge transfer and technology transfer mostly works together at the same rate of development to achieve transfer (Odigie, 2006).

Therefore, knowledge transfer is not really the same as technology transfer due to the pragmatic nature of intangible technological knowledge (Lee, 2010).

2.4. Types of knowledge and Technology Transfer

Knowledge and technology transfer can be discussed in different way as the understanding and experience of the transferee environments and clients. From the upper view of nature of knowledge and technology and its transferring behavior, commonly two types of knowledge and technology are discussed in literatures. Existing research suggests that formal and informal KTT may go well together in that informal contacts improve the quality of a formal relationship or that formal contracts are accompanied by an informal relation of mutual exchange on technology-related aspects. It is therefore likely that both types may occur simultaneously in order to transfer codified knowledge in the form of a patent or license as well as tacit knowledge through the interaction between the university scientist and industry personnel;

2.4.1. Informal knowledge and technology transfer: - it occurs in the way without involvement of directed efforts in putting knowledge and technology in to experimental use. Mostly it happens prior to evaluation of the nature, source, importance, and other characteristics of knowledge and technology. Activities such as personal experience, peer interaction, and publications have being seen as the means of knowledge and technology transfer in this type. It focuses on primarily non-contractual interactions of the agents like university academicians and industry personnel (Hussinger, 2013).

2.4.2. Formal knowledge and technology transfer: -this type of KTT holds a serious of designed activities directed towards transfer of knowledge and technology and its effective application. Mostly, activities in this type are components of the ideal model of lifecycle of development of technology and use such as evaluation activities, demonstration and control programs, and directed education of the professional and lay communities in the use of the new technology (Hoekman, 2004). The transfer is said to be through mechanisms like legal instrument like a patent, license or royalty agreement.

2.5. Channels of knowledge and Technology Transfer

Vertical linkages (interaction between business sectors) and horizontal linkages (interaction between industries and educational institutions) as a channel of technology transfer was discussed in (UEKI, 2011). On the other hand, vertical technology transfer is from research to development

and then to production; whereas horizontal transfer is technology transfer from one operational environment to another operational environment (Bennett, 2002).

Technology transfer channels can be differing so many times. The most common technology transfer channels are: -

1). Trade in goods and services;
2). Foreign direct investment and;
3). Direct trade in knowledge via technology licensing.

2.5.1. Trade in goods and services: trade can be conducted by government or individuals, even though the common goal is building a capacity. Again, trade is two dimensional activities in that it may be export or import. Every country, whenever exporting its goods and services, it is advertising type and level of knowledge and technology practiced in that country. It is the pressure to invite investors on their wellbeing. At the same time, all the import goods and services are coming with something new knowledge and technology in to the country. This incoming knowledge and technology can be utilized in manufacturing and service industries so as to improve products and service quality.

That is the way how to involve in international markets as of developed countries. Service engineering is the one which can be absorbed by trade. Trade openness has its own benefit as by reducing the cost of technology transfer and also effects as lowering economy of the country since it breaks the barrier to technology transfer to everywhere simply. Whatever, trade by its own is not sufficient; rather knowledge and technology absorption policies are mandatory to coach the required knowledge and technology successfully (UNCTAD, 2013).

2.5.2. Foreign direct investment: it is the most powerful KTT method (Hoekman, 2004). Policy makers in developing and emerging economies have placed attracting FDI at the top of their policy menu, in the hope that investment by multinationals companies (MNCs) will bring much needed capital, sophisticated and updated technological knowledge, production methods, marketing techniques and tacit and codified managerial know-how.

As literatures explained, the most qualified knowledge and technology equipped man power is also the result of FDI. In addition to providing capital, employment and, in some cases involving

local partners in established international value chains, FDI is a vehicle of technology and knowledge transfer, including for many soft technologies, such as managerial skills, marketing, or knowledge of standards and regulations in export markets. However, the success of FDI in every developing countries is influenced by the country`s level of economy and policy capacity and capability when seen in the eye of developed partners. Again reports and studies indicate that FDI technology transfer can be materialized through demonstration effects, labor turnover and vertical linkages.

When we say **Demonstration effects**, it is when local firms inquire KT from foreign companies. The form might be imitation or reverse engineering.

Labor turnover can occur whenever there is a physical movement of technical peoples across the economy in the country. The movement may be happen from foreign companies to local firms or from transactional corporation to local manufacturing firms. Otherwise, technical peoples may also open their own company to utilize the knowledge and technology which they acquire from anywhere available.

Vertical linkages are created when local companies are made to engage in the international supply value chain. That means, whenever the technical specification of products is being standard, they are required to upgrade their products accordingly by supporting it with absorbed KT (Khan, 2011).

Transaction Corporation is a major means of KT diffusion and it accounts about half of the world's R & D expenditure and more than two thirds of worlds business R & D. Foreign direct investment, R & D centers and small enterprises have been considered as core activities of KTT procedures which are to be under strong national innovation policy (UNCTAD, 2010).

Knowledge and technology transfer mechanisms are multiple in their mode. The main mechanisms adopted to transfer the technology were through face to face meetings, documents such as drawings, blueprints, detailed product specification, seminars, vendor conferences, company visits, training and overseas correspondence with first tier suppliers and machinery providers. They received the technology mainly through quality related training, documents and meetings. Some of the component suppliers have joint technical committees and the technology was transferred

through communications and joint meetings. Of the 50 suppliers, 48 of them (96%), stated that they received technology through communications and joint meetings (Khan, 2011).

Most common and effective channels of knowledge and technology transfer 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. A researcher also ranges FDI as the most practical knowledge and technology transfer channel in the world experience (ABRHA, 2018).

2.6. Knowledge and technology transferee environments

Knowledge and technology can be transferred in between several agents as of between universities, production companies, research institutions, different administrational offices and the like (Habib, 2016). Such like knowledge and technology transfer activities can be represented as in the figure below.

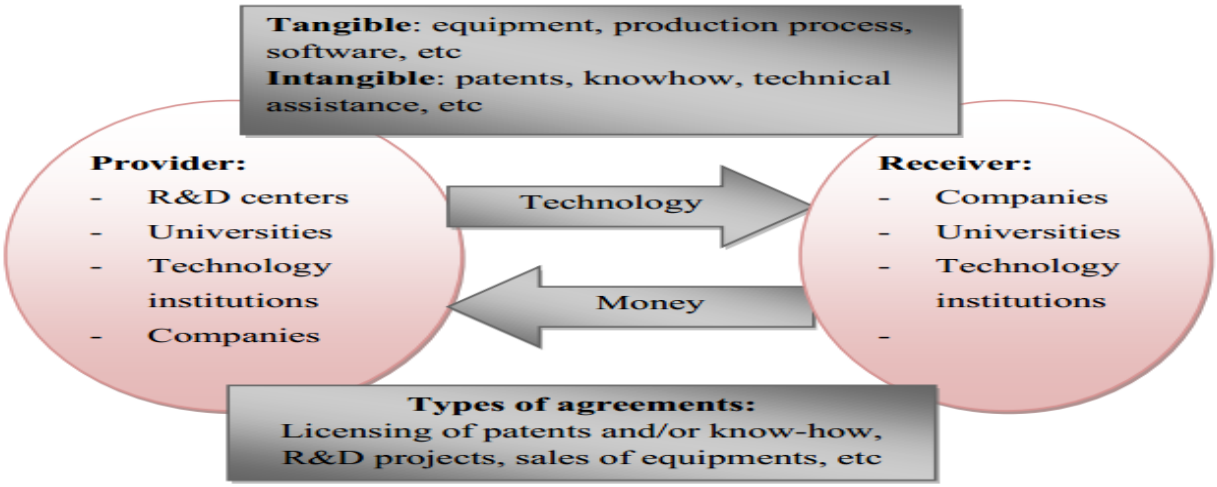

Figure 2. 2 Technology Transfer Environments: Source (Habib; 2016)

2.6.1. Knowledge and technology transferee between universities/research institutions

It is evident that most universities state one of their vision and mission is to disseminate and localize knowledge and technology (Renault, 2008). This message is off all universities in the world as they are sources new knowledge and technology to be implemented in the production companies. Procedures followed by universities to fulfill this vision and mission as we know all

are teaching, research and public service. For most knowledge based economic development countries, universities play a key role. For instance In UK, the government funds universities as a "third stream" for the purpose of incentivized universities KTT activities (Rossi, 2013). It seems also in progress in Ethiopia that community service in universities is incentivized now a day. In addition, university research offices are observed as to have an important influence.

To the same flow, Technology transfer offices (TTO) provides consultancy services to industries by assessing their R&D needs, bringing together researchers and industry to meet these R&D needs, and matching them with appropriate research projects at the university. The other way technology transfer offices facilitate industry-university partnerships is by matching up industries' needs with those of the university and introducing research projects and findings developed at the university to various companies. They develop project partnerships and collaborations through means such as project bazaars, company visits, and university industry meetings and also provide assistance to their industry partners who wish to seek external funding for their projects (Sart, 2012)

2.6.2. Knowledge and technology transferee between companies

This is the most common and simple to exercise way of knowledge and technology transfer environment. The transferring methods, type of knowledge and technology to transfer, purpose and other issues might be different accordingly, but knowledge and technology based economy is in movement around the world since the last few years.

> *"Technology and knowledge transfer needs will vary greatly by country and will depend on the structure of the economy and the level of industrialization, as well as overall development"* (Araujo, 2014).

2.6.3. Knowledge and technology transfer between research institutions and companies

There are three main key mechanisms or models of technology transfer from public research organizations to industry:

2.6.3.1. ***Sponsored research - Agreements to order research*:** This refers to application-oriented research, which is ordered and funded by the relevant industry under

conditions that will assure it of a license to use the product of the research as stated in the agreement. The order may be placed by and at the expense of an existing industrial company that is interested in the technology, or by another party that is interested in the promotion of the study and its industrial development. In a different and uncommon trend, this approach askes the industries to go in to the institutions in requesting the new technology developed by the research.

2.6.3.2. ***Commercialization of Intellectual Property Rights through License agreements*:** this is a legal registration of ownership of the intellectual property in inventions. A license agreement grants a person or an entity, usually an industrial organization, a license to use the patent and universities or research institutions are free to enter into the license agreement.

2.6.3.3. ***Creating a new company*:** is the mechanism in which new companies is being established based on of university technologies, also known as "spin offs". This refers to start-up companies, and happens mostly when a former companies are spilled over by an external body and decides to develop certain new research results into a product (Escoffier, 2015)

2.7. Role of transferring knowledge and technology

There are five main goals of technology transfer are introduced as to contribute to the economy, to facilitate research uptake for the public good, to develop mutual beneficial ties with industry, to motivate and retain academic staff and to increase the income of the universities (Jofre, 2013).

Economy of developing countries depend on the extent of KTT from the leading countries and the efficiency in which they absorb and diffuse it (Mojaveri, 2011). Three powerful variables to transfer knowledge and technology as human capital, social institutions and international trade are mentioned in (Ramos, 2015).

A country which has knowledgeable and technical human capital is supposed to be easily able to cop up world knowledge and technology whatever and whenever needed. Movement of peoples is the path of transferring knowledge and technology in this context (KAPUR, 2001). One important point raised here is that immigration of knowledgeable and technical peoples is poorly understood.

Once the country loses those potential peoples, it will exposed to increasing overall global output and inter-country inequality. This again comes with low capacity and capability to absorb knowledge and technology from abroad. The report under UNCTAD (2013) summarizes this problem as

> *"Whatever the transfer path, it is clear that if human capital in the host country is lacking, TNCs may not engage in hiring locally or partnering with local firms and trade prospects may suffer, causing a decrease in opportunities for knowledge and technology spillovers".*

Knowledge and technology transfer programs prevent critical knowledge loss by focusing on key areas. Some of the immediate benefits of KT programs are:

1. They provide reusable documentation of the knowledge required in certain positions or job roles.
2. They result in immediate learning and knowledge transfer when carried out by individuals who can either use the transferred knowledge themselves or have responsibility for hiring, training, mentoring, coaching or managing people within an organizational unit.
3. They reduce the impact of employee departure.
4. They integrate staffing, training, job and organization redesign, process improvements and other responses.
5. They aid in succession planning.
6. They prevent the loss of knowledge held only in employees' heads when they leave the organization or retire.
7. They enhance career development (Perkins, 2012).

2.8. Sources of knowledge and technology

Different sources of knowledge and technology and classify generally in two: internal and external (UEKI, 2011). Firms which can innovate their production with the knowledge and technology which comes from the employees in their company are likely said to use internal source of knowledge and technology. This type of source of K&T is mostly independent of the external world. On the other hand, some firms can utilize and internalize incoming knowledge spilled over from partners. External linkages have therefore also been considered as an important source of

knowledge especially for firms without competitive internal knowledge. A study over the sources of knowledge and technology lists and competes the source like undertake own research and development, through formal agreements with companies abroad (e.g. licensing), through formal agreements with local companies, from Universities and research councils, through embodied technology in equipment & machinery and through imitation. The technology seekers get above 56% of technology from internal source (R & D) (Pouris P. A., 2012).

2.9. Factors affecting effectiveness of knowledge and technology transfer

For simplicity, all the factors that affect technological development in developing countries fall under three major categories. Problem related with transferring issues, problems associated with effective usage and problems connected with updating that knowledge and technology. An early assessment of the impact of the national regimes on technology transfer suggests that the regimes had an important positive effect in three key areas (Odigie, 2006).

(a) Reducing the explicit prices of the technology within technology transfer agreements,

(b) Eliminating restrictive clauses in technology transfer agreements and in

(c) Shortening the terms & duration of the agreements.

Another scholar classifies the factors in other way as human capital and absorptive capacity, Connectedness and networking dynamics, Trust and common objectives (Araujo, 2014).

Factors are different in between different clients of knowledge and technology transfer. Knowledge and technology transfer factors can exist in between universities and industries. The summery of this concept is shown in the figure below.

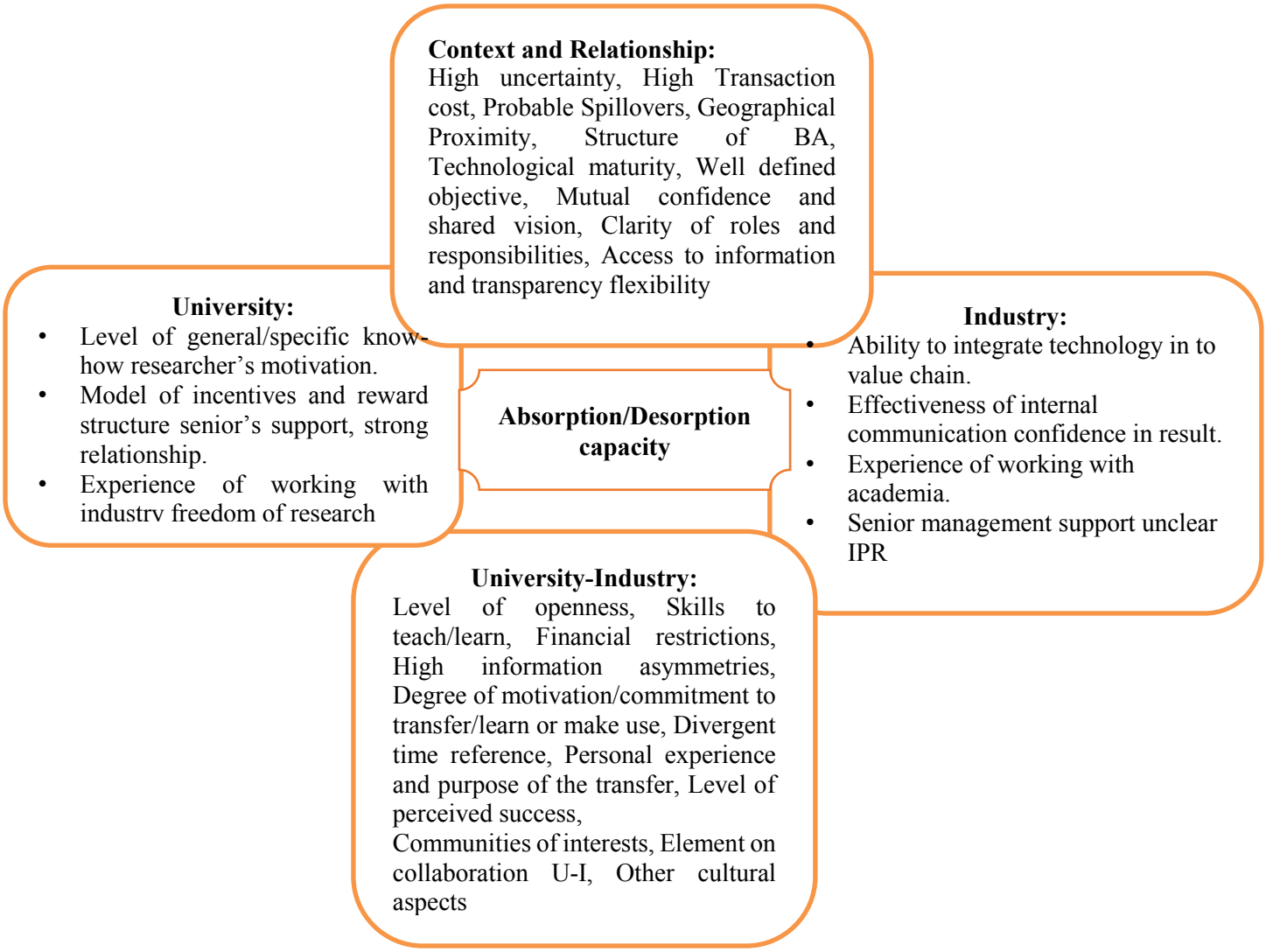

Figure 2. 3: Factors Affecting KTT between University and Industry: Source (Giudice, 2015)

Legal constraint, infrastructural barrier, cultural barriers, attitudinal and communication barriers are identified as the major block walls of KTT in the research entitled. Parallel to this powerful factors of knowledge and technology transfer experienced in most environments have been also mentioned and explained. These are: law and policy, market, technology basis and infrastructure status (Gatew, 2011).

Furthermore, some barriers of technology transfer was discussed as innovation costs too high, inadequate funding, lack of appropriate finance, excessive perceived economic risk, licensing constraints, lack of qualified personal, lack of customer responsiveness to new goods and services, insufficient flexibility of regulation of standards, organization inertia within company, lack of

marketing information, lack of technology Information and lack of cooperation with other firms (Pouris P. A., 2012).

The study indicates that first four barriers mentioned above really matters in knowledge and technology transfer process was and weighted as high.

A scholar conducted investigation over the factors of technology transfer tried to summarize their feature and relation as seen in the figure below.

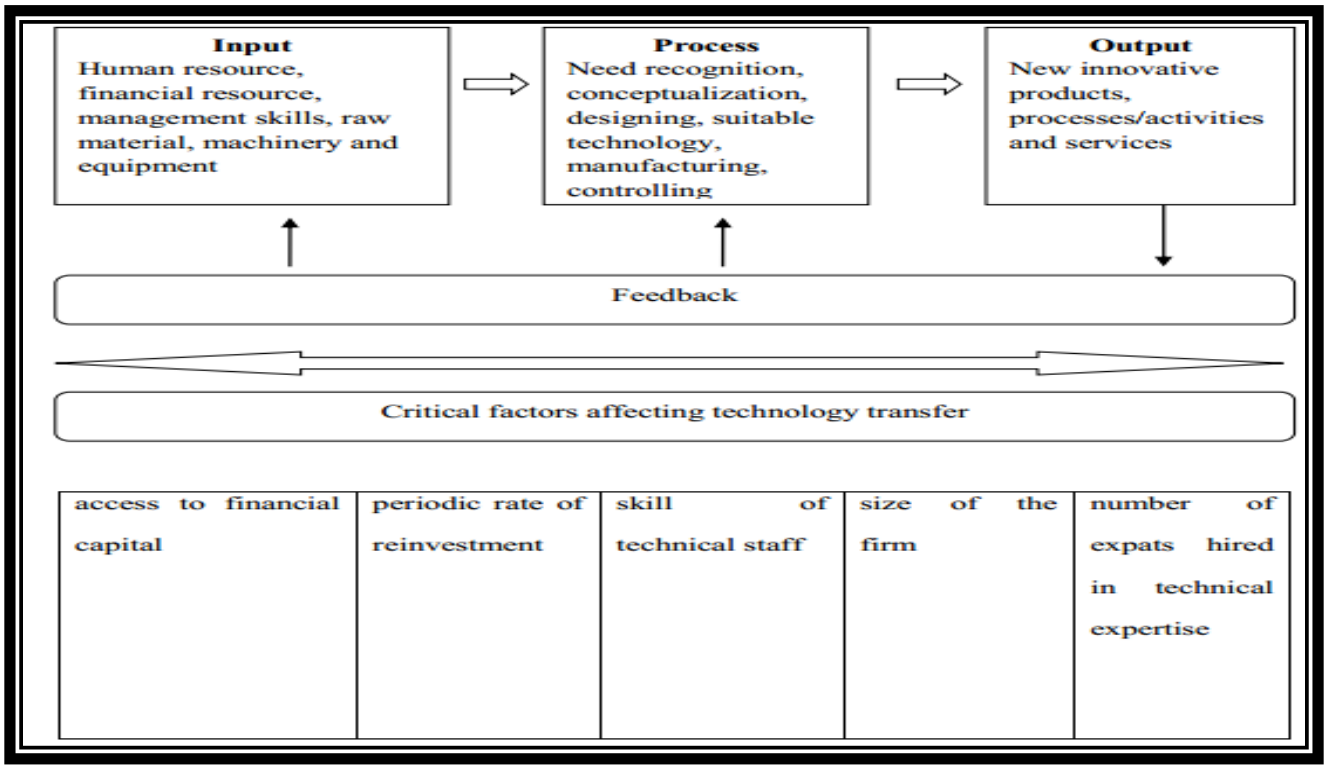

Figure 2. 4: Technology Transfer Factors: Source (Abrha, 2015)

2.10. Knowledge and technology transfer methods

Even though it may vary between different scholars, most of them relays over one or more of the following KTT methods.

***After Action/Lessons Learned Reviews*:** debriefings that identify, analyze, and capture experiences, what worked well and what needs improvement, so others can learn from those experiences.

***Best Practices*:** identification and use of processes and/or practices that result in excellent products or services.

***Co-op/Internships*:** formal arrangements that provide for an experienced person to pass along knowledge and skills to a novice, often so that students can obtain practical on-the-job experience and academic credit as part of their educational experience.

Communities of Practice (COPs): groups of individuals who share knowledge about a common work practice over a period of time, though they are not part of a formally constituted work team and generally cut across traditional organizational boundaries.

***Document Repositories*:** collections of documents that can be viewed, retrieved, and interpreted by humans and automated software systems.

***Double Fills*:** the practice of the employee who is leaving a position and the replacement employee occupying the same position for a period of time, to allow the new employee to have knowledge about the position transferred easily and effectively.

***Exit Interviews*:** structured meetings with departing employees, to capture critical parts of their job knowledge.

***Expert Interviews*:** sessions where one or more people who are considered experts in a particular subject, program, policy, process, etc., meet with others to share knowledge.

***Job Aids*:** tools that help people perform tasks accurately, such as checklists, flow diagrams, reference tables, and decision tree diagrams.

***Job Rotation*:** job assignments in which an employee occupies different positions for several weeks or months each, so that knowledge about those jobs can be transferred directly.

***Job Shadowing*:** less active and shorter term than job rotation, a practice in which an employee observes another in the everyday conduct of the job.

***Knowledge Fairs*:** events that showcase information about an organization or a topic, either internally or externally.

***Knowledge Maps and Inventories*:** catalogs containing references to information/knowledge available in an organization and where it is located.

***Mentoring*:** pairing an experienced, skilled person (mentor) with a lesser skilled or experienced person (protégé), with the goal of developing or strengthening competencies of the protégé.

***On-the-Job Training*:** an experienced employee teaching a new person how to perform job tasks, either in an informal, unstructured manner or more formally with training materials, schedules, and records of the training.

***Peer Assist*:** knowledge and experience sharing among two teams, based on dialogue and mutual respect, typically used by a work team starting up a new project or task that calls upon another team with experience in the respective field of activity.

***Process Documentation*:** developing a written and/or graphical record of a specific work process.

***Storytelling*:** construction of fictional examples or telling of real stories to illustrate a point and effectively transfer knowledge, either informally or as a part of more structured presentations.

***Training*:** a large variety of activities, instructor-led or self-directed, designed to facilitate learning (of knowledge, skills, and abilities or competencies), including classroom instruction, simulations, role-plays, computer or web-based instruction (Perkins, 2012).

2.11. Knowledge and technology transfer Policy

The policy by definition includes the trend, current status and future plan of a country or organization. Developing countries have long sought to use both national policies and international agreements to stimulate international technology transfer (ITT). National policies range from economy-wide programs (e.g., education) to funding for the creation and acquisition of technology, tax incentives for purchase of capital equipment and intellectual property rights (Tsegaye, 2015).

National policies on knowledge and technology transfer may vary as per the absorption capacity and the choice of methods of each country based on the resource which would be utilized to adopt and adapt knowledge and technology. Spillover can be the best and preferable policy for one

country and purchasing the technology in kind would be also the choice for others. The infant stage policies on technology transfer mainly focuses on forcing foreign investments to leave the knowledge and technology for the host country. Countries like Japan, Korea, and Taiwan have had such experiences in the oldest history of their development strategy. However, nature and shape of the policy changes itself through time in accordance with the governmental rules and based on international relation regulations (Hoekman, 2004).

A survey conducted in European countries over the knowledge and technology transfer policy reveals that the vast majority of countries (90%) insures as national and regional governments promote policies and procedures for the management of IP resulting from public funding. However, most of the policy strategy measurement and supporting techniques was performed in non-legal way. But the national and regional government were intentionally support the development of knowledge and technology transfer through universities and other centers (Arundel, 2013). Knowledge and technology transfer is one of the priority action in the national policy of South Africa. Department of Science and Technology (DST), is primarily work for establishing the Technology Innovation Agency with the objective of supporting the national technological innovation and invention in order to improve economic growth and the quality of life of all South Africans by developing and exploiting innovations and inventions (Pouris P. A., 2007).

Scientific society complies on the point that national knowledge-based economy is commonly measured by the expenditure on civilian R&D as a percentage of the gross domestic product (GDP). A research recommendation over the technology transfer policy indicated that by the year before 2000, most countries with the level of this quantity was below 1% and it grows to 5% through the year 2008. In Israel, 80% of the R & D fund is derived from the private and public sector. Israel, believed in having best practice of technology transfer, has R & D sector categorized in three places; industrial, academic and governmental. The industrial sector is defined as market-oriented. Its objective is to introduce new and innovative products into the market which will sell and benefit the shareholders. It is mainly managed by the business sector and the investment is also funded by the industrial community.

Whereas the academic sector is characterized by research that is intended to enrich the pool of common knowledge, and is not directed towards a specific application, otherwise known as "basic research." About 50% of the Israeli governmental investment in R&D (which is about 10% of the national R&D investment) is directed towards academic research. The third and last sector of R & D is governmental R&D sector, and pertains to necessity-oriented applied research for the public's good. "Necessity" refers to, inter alia, the areas of agriculture, public health, quality of the environment or education, which the government must provide its citizens with, and which often require R&D, even if the products do not have a potential market for sale (Escoffier, 2015).

Ethiopia in the early period, have had a technology transfer trend which seems “forced technology transfer”. Starting form Tewodros II, in which production of huge military weapons and other traditional farming materials was conducted by using the direct skill and technology of foreign strangers; and Minilik’s ruling period was known for adapting and adopting different technologies by enforcing foreign experts to do so which almost believed to be the base for the current Ethiopia. Specially, Minilik II ruling period was investing on direct technology importing not the only the soft skill, but the physical technology itself which can be utilized directly. Other technical know-hows related to the imported technology was being thought to Ethiopians by the foreign experts who was deliberately invited through official letters exchanged between different European country leaders. This fantastic feature of action over technology development tells us that better experiences and policies which are available now a day in developed countries was practiced by Ethiopia by the early period (Atse Minilik II; pawlos gnogno; 1984).

However, afterwards technological evolution of Ethiopia has been stopped in case of different reasons, mainly political instability. The imperial period was mainly exercising heavy technological innovation as like the design and trial of huge national dam over the Abay river, air transport construction, fuel and petroleum projects (which is not transferred to this date). The socialist government and the period since then has passed in their own trial of technological performance. Later in 1970th period, new industrial revolution was conducted and that period is known as an opening for modern industrialization (Gatew, 2011).

Ethiopian reinstalled science technology and innovation policy (STI) was formulated by the early 1993 during the transitional government recognizing that better standard of living can be driven

through the implementation of economic growth via science and technology. This period national economic development policy has been called "agricultural development lead industrialization; ADLI". Due to the concern given to agricultural sector, industrial revolution is still in the infant stage. More ever there were a problem with that policy in which it was unstructured, politically restricted to the central government, doesn't assume the rapid technological change in relative to Ethiopian society. Mentioning all reasons to revise the national STI policy, the updated national STI policy by the year 2012 states the gaps observed with the first national policy (implementation guide) and come up with the new policy filling the gaps (FDRE c. , 2012).

A review study over Ethiopian national STI policy have discussed over the policy structure and organizational scheme of implementation.

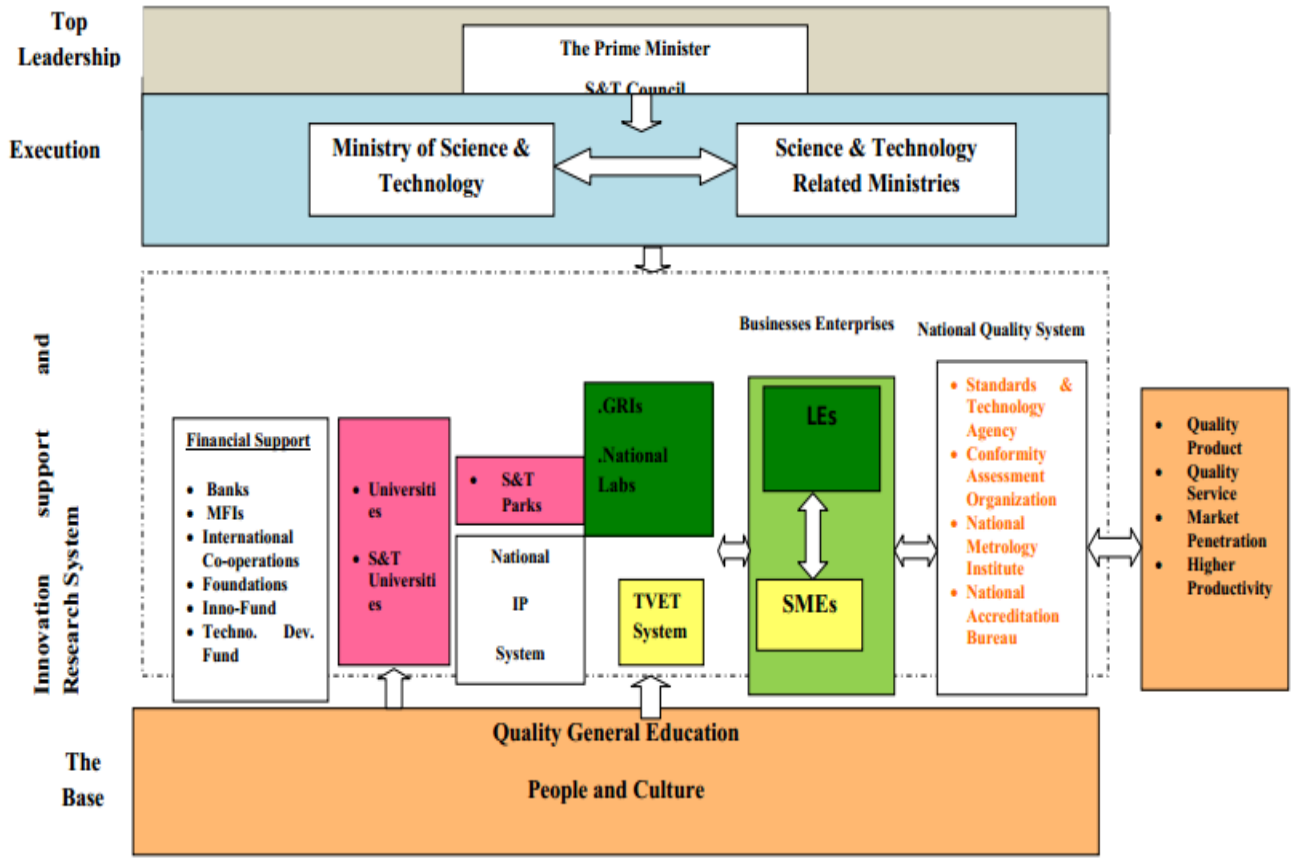

Figure 2. 5 Innovation System of Ethiopia: Source (Tsegaye, 2015).

2.12. Knowledge and technology transfer theoretical models and frames review

A bulk of strategies has been written down as the FDRE science, technology and innovation policy; (FDRE, National Science, Technology and Innovation Policy, 2010). The declaration touches strategies regarding human resource development, manufacturing and service providing enterprises, research, financing and incentive schemes, national quality infrastructure, Universities, Research Institutes, technical and vocational education and training (TVET) Institutions and Industry Linkage, intellectual property system, science and technology information, environmental protection and development, international cooperation.

Again the policy tries to separate the role of core governmental bodies like National Science, Technology and Innovation Council and science and technology minister. Policy implementation principles have been also feed as a written document to the respective bodies. Some of structures and organizations are already existed physically before or after the strategy as the governmental branches. Actually, the movements around the issue now a day is based on and through these listed structures and strategies in one or other way.

To the same context, the two brothers; Anouk Kendall and John Kendall have discussed three major preliminary works to be accomplished so as to perform effective KTT. In their paper, present and future definition of technology and its importance for the society is presented. The transfer issues are actually considered between universities and the industry. Whatever the environment KT is required to transfer, they believe that the following structures should be realized for that purpose.

1. Creation of new institutions or new or modified sections of universities, which concentrate on applied research and which exchange personnel with industry on a regular and formal basis.
2. To put an emphasis on the creation of spin-off companies with the expertise to take research and develop it into commercial, marketable goods and services. Again the exchange of personnel is an essential ingredient in this.
3. To establish a Government All-Party Committee that overrides partisan politics and that sets up and administers policies for effective technology transfer and utilization. These policies have to be long term and therefore be able to survive changes in Government (Kendall, 2011).

Critical factors affecting developing countries in cultivating technological capability has been studded in Indonesian manufacturing industries (Kumar U. K., 1999). Firm's technological absorption capacity in terms of R &D activities and availability of technological personnel, transfer channels, government's involvement and firms learning culture was raised as the main factors preventing Indonesian manufacturing industries from being owner technology. Strength and weakness of technology transfer mechanisms have been also presented by Vinod Kumar. A model of relationship between technological capability and international technology transfer was proposed as the finding as seen in the figure below.

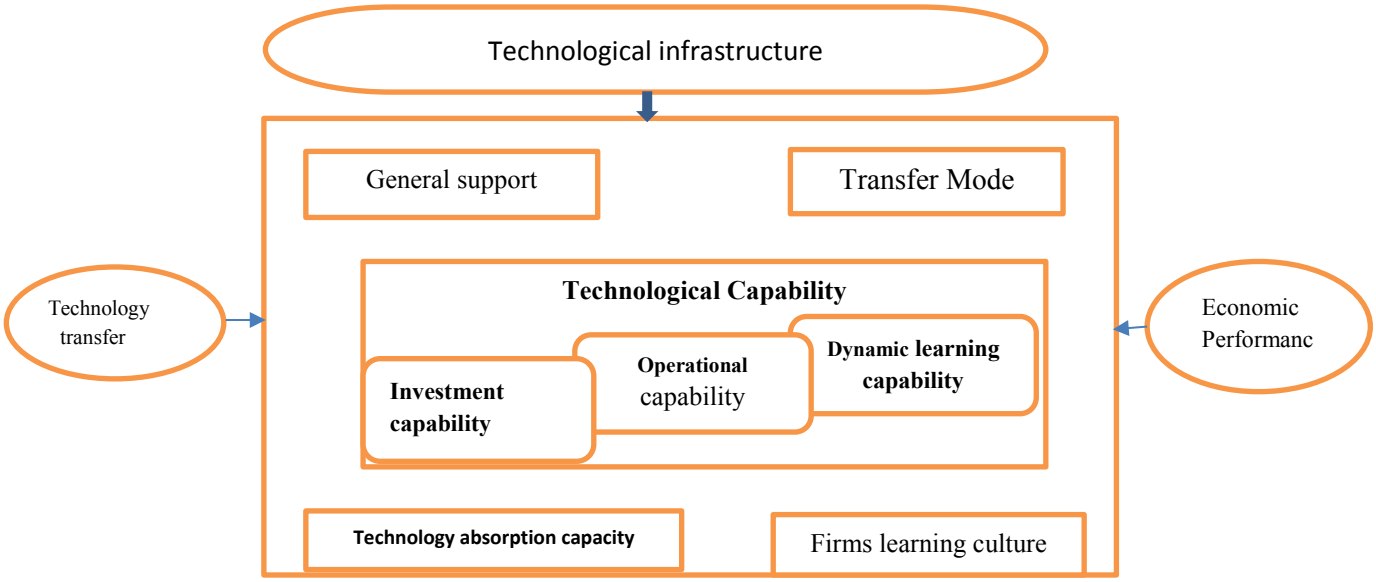

Figure 2. 6 Conceptual Model of Technological Capability Building: Source (Kumar, 1999).

All in all, Vinod Kumar did not tell us the detail nature of each component of the model. We cannot understand about what are the government's support, what are transfer modes, and the like. Only he presents the relationship between concerning bodies. .

Carina Araújo and his friend strongly argue that the only powerful determinant of technology transfer is "highly educated human resource who receives complementary training in technology transfer issues". Additionally Through their work, they dealt on prior experience of partnership, trust, connectedness and network of organizations that have direct or indirect impacts on international technology transfer. Still they did not represent the way and mechanism of

technology transfer in a visible manner so that companies trace it and gain technology via (Araujo, 2014).

The impact of technology transfer offices on capacity building in creativity, innovation and entrepreneurship really matters for developing countries. Technology transfer office activities are critical here in order to comprehend the strategy in delivering and building capacity for innovative products and services. Whereas technology transfer mechanisms in manufacturing industries yet and remains in-addressable to the problem raised this day like in this paper (Sart, 2012).

Critical partners of knowledge and technology in the transfer area has been discussed and the target group of the training determines how the training will be delivered, what will be its content & what kind of method will be used. Since the knowledge and technology transfer can be simply understood as a process in which scientific findings turn into practical solutions, the main target groups of the training should be composed of:

- *Researchers/Scientists* - inventors and technology developers;
- *Businesses/SMEs* – end users of new technologies and innovations;
- *Academia / Universities* – providers of education and training, knowledge dissemination.

These three major areas through which KTT can disseminate and crosses over from one to each other plays great role in implementing the KTT policy. These groups create so called knowledge triangle which - when working optimally - is able to support the innovation process and to facilitate the development (K. Szegenyova, 2014).

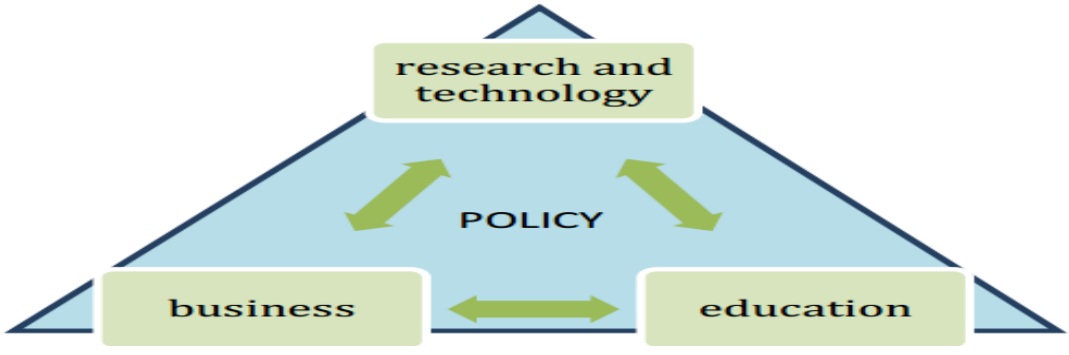

Figure 2. 7 Technology Triangle: Source (K. Szegenyova, 2014).

The impact of culture on technology transfer was also presented in (Lee, 2010). Methods like communication, franchise handbook, training and creating cultural awareness have been recommended by the researcher for the study area as to reduce the cultural impacts on technology transfer. Following his idea of cultural impact, he developed a model of technology transfer in a cross border context as seen in the figure below. Whatever did him, the problem of ways of knowledge and technology transfer has not been addressed well. Rather the model presents one of the critical issues in technology transfer.

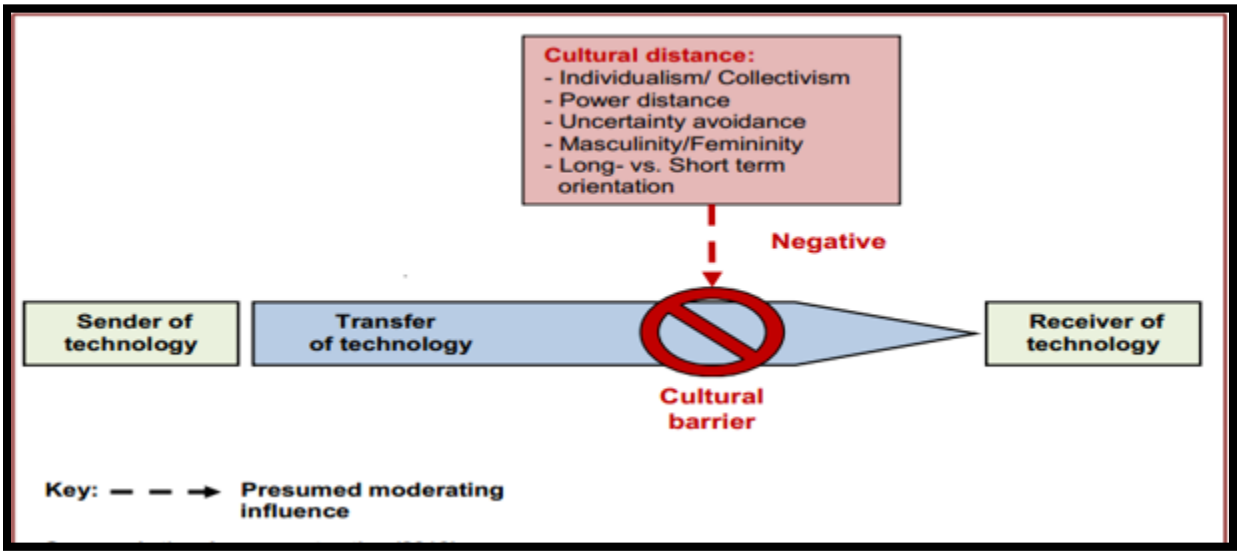

Figure 2. 8 Model of Technology Transfer in A Cross Border Context: Source (Lee, 2010).

A schema representing technology transfer between academicians and business has been developed concerning on means of gaining KT in common. This study did not consider the knowledge and technology which are already in practice that can be transferred from investments like industry parks. It seems a little brief model but, remains unequipped for transferring technology in industry parks. Rather, it works better between academician and starting businesses (Arayici, 2011).

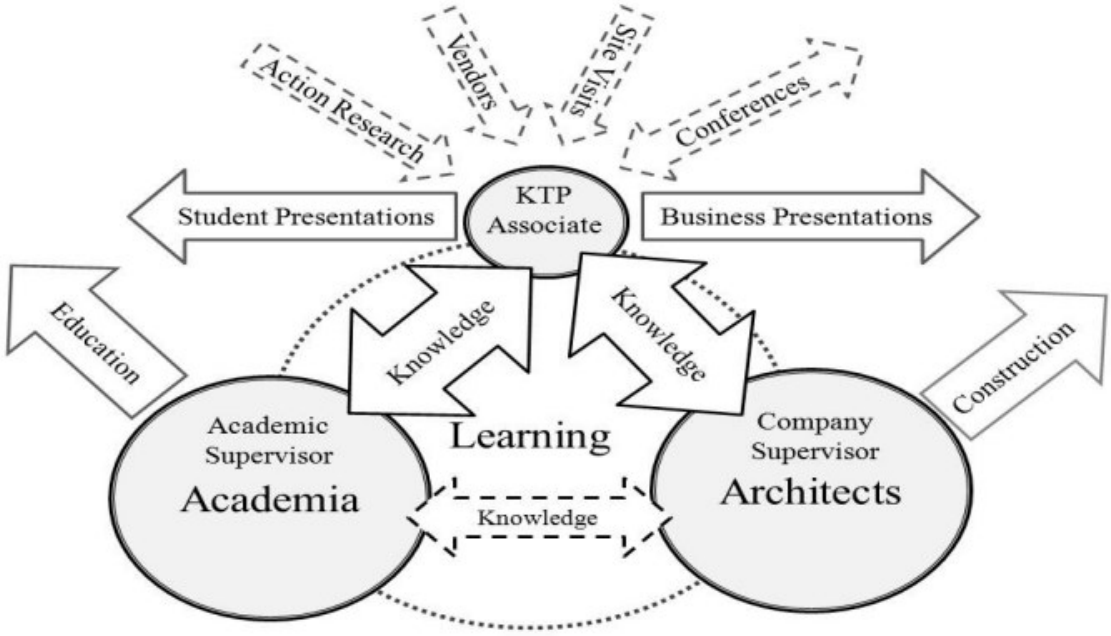

Figure 2. 9 A Schema Representing Technology Transfer between Academicians and Business: Source (Kumar, 1999).

Evaluation of Technological Knowledge and Skill Transfer Performance conducted on Ethio-Indian Twinning Project Phase I, concerning on measuring the outcomes of Technological Knowledge and Skill Transfer twinning projects contrast to their target develops another framework. It is really a nice work yet. But, it doesn't show how to transfer KT from owners to the seekers, rather focuses on how to measure the twinning transfer projects with respect to their target. Now it comes later that we need to have an effective channel of KTT first. Then, we can measure how a detail of needed knowledge and technology is transferred via (Habib, 2016).

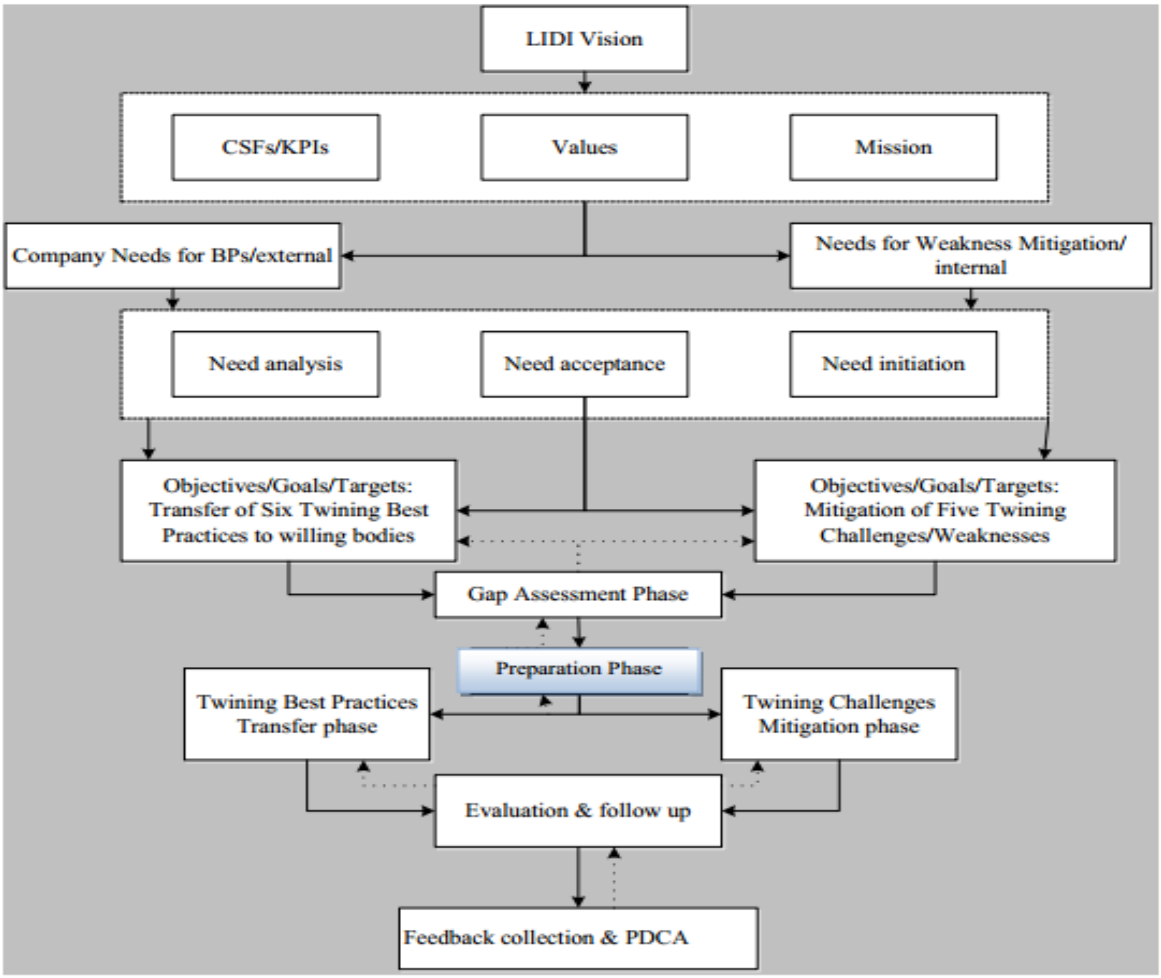

Figure 2. 10 Technological Knowledge and Skill Transfer Performance Measurement Frame: Source (Habib, 2016)

A survey study by Federica Rossi and his friends, focused on measuring the performance of universities knowledge and technology transfer have been conducted in United Kingdom's Higher Education –Business and Community Interaction (HE-BCI). Indicators were developed as a means of measurement to know if the universities are capable of transferring knowledge and technology or not. This work concerns mainly on analyzing universities capacity that might enable the knowledge developed by academicians diffuse to business areas. Indicators chosen are just terms/variables expressing different capacities of the universities and was rated in numbers as mean and deviation to indicate their impact on transferring knowledge and technology (Rossi, 2013).

The figure below shows how knowledge can be created and made ready to transfer to others (Perkins, 2012). He argues that, once knowledge is created and utilized by higher experts, it has to be transferred to the others who need to have that for their jobs.

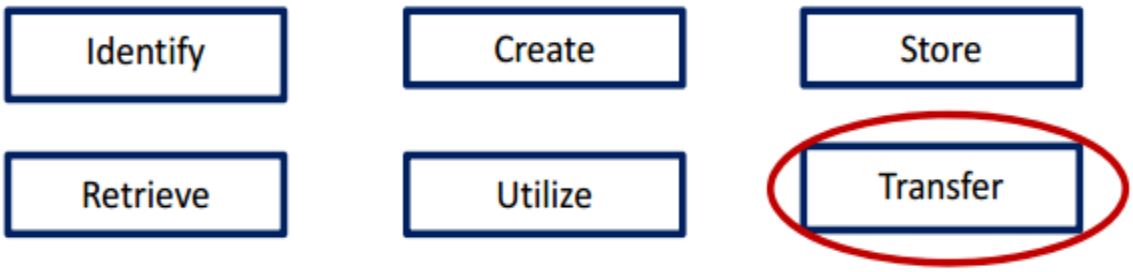

Figure 2. 11 Main Components of Knowledge Management: Source (Perkins, 2012).

A study by (lemma, 2011) has been dealt with the impact of FDI on technology transfer. Different country experiences and outlooks over the FDI were presented here and the gap in Ethiopia identified in a relative way. Finally, a framework which was combined from reviewed literatures has been developed by the researcher for Ethiopian technology transfer.

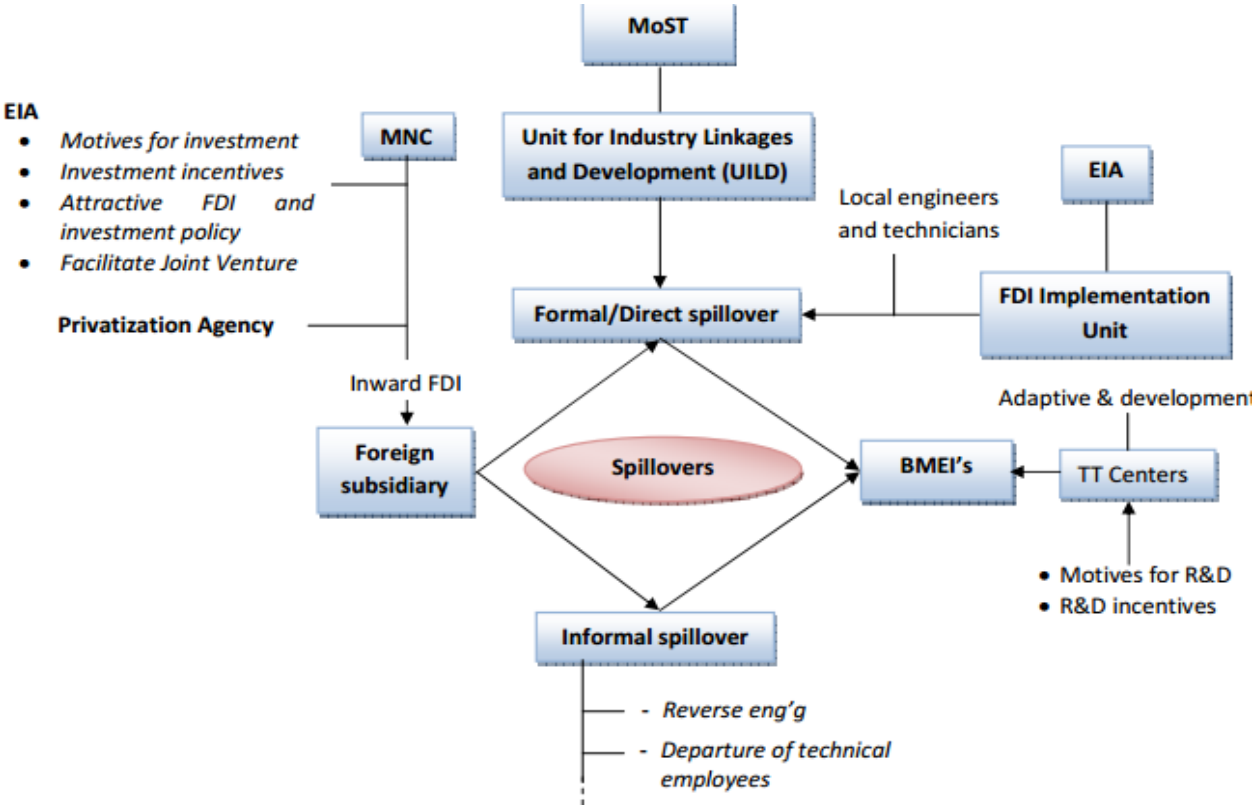

Figure 2. 12 Technology Transfer Framework in FDI: Source (Lema, 2011)

As we can see from the framework, it focuses on the main actors in transferring technology. Role and function of those actors have been also listed form the point of FDI. Now the way those actors are doing will determine effective technology transfer. For example, if we take TT centers, training can be the main channel of transferring knowledge and technology to trace the existed practices in industries. But, the way training is held comes over the dominant factor. In addition, this framework didn't consider actors and activities within industries in transferring technology as of detail.

2.13. Indian experience in knowledge and technology transfer

As of most agricultural based countries in economy, India was fostering agricultural activities for a long time in the history. Due to this background of the country, In India, the technology development transfer has been supported through government-run research and extension programs, agricultural universities, NGOs, private sector, informal farmer-to-farmer exchange,

and international development organizations. However, the technology transfer by public institutions has been dominated by two main approaches: technology transfer through extension systems which is long standing and IPR-led technology transfer that is recently emerging. Most modern sense of technology transfer were activated by extension programs and the IPR (intellectual property right) system. Through time the IPR system is shifting to IPR licensing process and then technology transfer is totally implemented in the country via making linkages and partnership with the private sector (Technology transfer & commercialization; experience of India & USA, 2014).

Prof. Pouris in his investigation stated that Indian government accounted about 74% of all the responsibilities in knowledge and technology transfer activities for the last 50+ years. The government adjusts KT policy more than four times so as to update the system to equip with the upcoming nature of technology. R & D and Educational expenditure has been increasing from 50% to 100% in each 5-year transformation plan so as to accomplish the plan to be one of the top 5 developed countries in 2020. The government deliver incentives for young people to pursue scientific careers and a survey is conducted on developed countries handling latest technology to adjust themselves in assisting selection of critical technology for prior investment (Pouris P. A., 2012). For that matter, STP (science & technology program) sets up a team called "Technology Information, Forecasting and Assessment Council"; (TIFAC) so as to perform the above follow up task. Dual benefit (mutual agreement) is exercised on heavy and important technologies so as to protect themselves from denial of technology by other counties.

2.14. Korean experience in knowledge and technology transfer

Korea was one of the poorest country in the world before 1960. But by the 1st five year economic revolution of the government "export-driven industrialization strategy", they implement all the necessary planned activities aggressively to achieve the self-sustained economic growth by overcoming the challenges including scarce natural resources, the small size of the domestic market, the less competitive private sector and limited capital. By doing so, Korea had become amongst of the advanced countries in economy (korean ministery of knowledge economy, 2012). In fact, technology in Korea had been treated as the driving engine of recovery from an economic crises since 1996. Technology growth rate in Korea was measured as 14.6% as compared to that

of 7.5% of GDP rate. Technology Export quantity accounts about 36% out of the total export size of the country. Korean government plays a leading role in adjusting the technology development strategy (IT839-2005 and u-IT839-2006) and the follow up system for implementation is installed from the technology lab to the market (Sung, 2008).

Prof Anastassios Pouris in his assessment of technology transfer trends stated that, the top level country administration is the main actor in KTT strategy. KT priority really matters for Korean government to achieve the goal following the strategy set at the beginning. Not only the priority for knowledge and technology but also for areas that needs to be developed first had given a focus by the higher planner and control body of technology transfer. At the top governmental management level, there is an authority called "ministry of knowledge economy" which concentrates on coordinating activities related to knowledge and technology (Pouris P. A., 2012).

Korean Governmental budget for R & D have been made to increase from 25% in 2008 to 50% in 2012. Significant governmental incentive is common for activities related to R & D. Korean ministry of education, science and technology (MEST) has been launched a new plan called "The Second Basic Plan for Nurturing Human Resources in Science, Engineering and Technology over the period of 2011-2015". This plan emphasizes on human resource development in which making the right link between humans and science & technology, lifelong learning and support for humans participating in science and technology, more collaboration and more efforts between governmental organizations and private sectors so as to attract the majority society towards science and technology area.

Technology infrastructure to promote and deepen local technological capabilities is given a weight in Korean government and they heavily invest on it. On the other hand, reverse engineering, adaptation and own product development to develop their own technological capabilities is a big center of technological revolution for Korea. Due to this, local R&D investment was a pillar to build up technological capabilities. Normally, Korean government pulls FDI only when it was the only alternative of obtaining closely-held technologies or gaining access to world-markets. Foreign investors were even forced to sell out, after the technology has been absorbed locally. The government also intervened in technology imports and contracts to lower prices, strengthen domestic buyers, and maximize the participation of local consultants in engineering contracts to

develop basic process capability. The government stipulated that foreign contractors transfer their design knowledge to local firms, in plant and process engineering. In doing such series strategical actions, Korea have had come one of the recent developed country which bases their economy on exporting technological products.

2.15. Chinese experience in knowledge and technology transfer

After the separation of Soviet Union, China experienced difficulties to sustain a balanced economy. Since repeated policy wise movement is done along with knowledge and technology, the state comes successful in adopting and adapting technology. China is known for "forced technology transfer" in the growing history of the territory. Preferential taxation, simpler licensing procedures, and freedom to import inputs of materials and equipment, more autonomy from bureaucratic interference, interest free loans, and the right to retain and swap foreign exchange with each other were given by the state administrators as an incentive for foreign investors to flow to China (Gatew, 2011).

In addition to foreign investors, local enterprises which invest on technological sector are also permitted for an additional tax benefits. Also, Chinse Governance motivates Governmental and private sector to buy a share in America and other developed countries and it is well known that China have numerous huge Companies out of her territory. Self R & D activity was also a transitional stage of Chinese technological innovation progress which contributes a high role in moving forward to an expected stage in technology (Branstetter, 2018).

2.16. Industrial parks

Globalization now a day is a means of connecting the world in different networks. Technology comes to be the powerful tool of connection between countries in the world. The imbalance between countries rises a question of "how to connect" to those of developed ones. In this issue, industrialization was found to be a key way to go forward in technology and to connect with the rest world for mutual benefit. This general concept have been used to generate a new technology pulling sector so called "industry zone" which now this day modified as "industry park" (IP) (Azizov, 2001). Industrialization through IP have been proved as the driver of economy in different countries history. A survey study over the history of IP (case of Korea) mentioned that

industrialization by its behavior needs a serious follow up and progressive approach so as to sustain the smooth economic growth (korean ministery of knowledge economy, 2012). Most of the developed countries start with foreign export revolution via industrial parks development strategy. Korea, china, India and the like have common feature of industrialization history and technological development in the economic goal of the governmental officials.

The so called "Mortenson", a Chinese reporting channel discusses about the wide and stepped IP development over the Yangtze River named as "the Yangtze river delta". This project deals over the Chinese government "12th five year plan of the regions concerning on forming eight economic zones based on urban agglomerations. These were Greater Yangtze River Delta Economic Zone, Pan Bohai Economic Zone, Greater Pearl River Delta Economic Zone, Northeast Economic Zone, Taiwan Strait Economic Zone, Central China Economic Zone, Southwest Economic Zone, and Northwest Economic Zone. The report mentions strength, weakness, opportunity and treats of each industry zone from the perspective of absorption of technology and contribution to the Chinese development (Mortenson, 2009). Development and implementation of IP is mostly linked with the countries government officials. This is because of the nature of the revolution in that it needs high investment and progressive strategy based actions incorporating national and foreign experts and investors.

Industrial parks have been defined differently by different scholars. Saleman and his friend tries to clarify industrial parks as follows.

1). the provision of functional infrastructure is much easier to plan in a geographically limited space, particularly for delivery constrained governments.

2). the concentration of firms can provide significant spillover effects both inside and outside the park.

3). information spillovers, including knowledge and technology; the specialization and division of labor among enterprises; the development of skilled labor markets; and the development of markets around the parks (Jordan, 2014).

The definition can be redefined as per the age and the nature of technological evolution and in accordance with the circumstance of the user. Another researcher puts the definition of industrial parks as:

> *The term "industrial park", which is used interchangeably with the term "special economic zones", encompasses a number of interrelated concepts, including Free trade zones, Free ports, Foreign trade zones, Export processing zones, Trade and economic cooperation zones, Economic processing zones and Free trade zones."* (Azmach, 2019).

Industrialization has become the new interest of many countries around the world since the early 1960 (Tezera, 2018). For most developing countries, industrial parks are believed to maximize resource integration for limited production factors within a certain spatial scope in attracting labor and capital-intensive domestic and foreign investment in manufacturing and service industries. IP can not only increase job opportunities, wages and skills of local workers, but also they can establish links to global value chains through participating in international competition. Through then, makes full use of comparative advantages to promote the upgrading of industrial structure, and constantly improve the country's position in the international division of labor. Currently, the IP economy has become a global trend.

On the other hand, cluster development, and industrial park and zone programs in particular, have also been subject to significant criticism. There have been controversies regarding land allocated for their construction, sometimes at large scale, especially when parks are long delayed or scarcely occupied, fueling accusations of land speculation (Saleman, 2014).

Ethiopian government, have been giving an attention for successive policies and strategies such as research and development planning summary (RDPS), plan for accelerated and sustained development to end poverty (PASDEP), agricultural development lead industrialization (ADLI) and growth transformational plan (GTP) since the last three decades economic movement. To ensure a sustainable development of the economy, part of agriculture in the total economy should be reduced and more labor should move to the industry. United Nations industrial development organization (UNIDO) is one of the major cross country project processing organization, and is

assumed to be part in contributing the preparation of a sub-report on IP in Ethiopia. The study determines that IP in Ethiopia have contributed significantly to the nation's industrial development in terms of creating employment, increasing government revenue and export, diversifying the industrial products, attracting Foreign Director Investment, and attracting foreign exchange (UNIDO, 2016).

The organization have had an experience of more than 20 years in promoting and supporting industrial parks development programs of member countries. The aim is to combine the experience of various types of industrial parks around the world to explore standardized and efficient park development and operation models, and to propose relevant policies guidance for industrial parks in developing countries. UNIDO in conjunction with many partners, namely, the World Bank, Asian Development Bank, African Development Bank, European Union, China, Germany, and Switzerland, jointly developed the "*Establishing UNIDO Industrial Parks Development Guiding Framework"* (Tezera, 2018). Developing IP was found be important to achieve the stated economic strategies.

As per IPDC (Industrial parks development corporation) reports, The role of IP in Ethiopian is also explained as "To realize the ambitious development plan of the country aiming to rapid industrialization nurturing manufacturing and agro-processing industries, to accelerate economic transformation and attract domestic and foreign direct investment". In accordance with the IP proclamation, there are three pillars of establishing industrial parks: which are; job creation, enhancement of foreign currency and technology transfer. Around six major roles and functions of industrial parks are identified via the proclamation and regulation of IP. These are: developing IP, managing IP, sales and renting out developed IP for foreign and domestic investors, handling contract agreements, assuring human resource development in cooperation with park management and industry minister and contribute to national policy along with transformation plan (Negarit F. , 2017).

Two types of industrial parks are announced which are large, medium and light scale industrial parks on one hand, integrated agro-IP are on the other hand. Bole Lemi Industry Park is Ethiopia's first IP developed by IPDC as an export processing zone. Now this paper concentrates on the first

category; that is large, medium and light scale IP. Bole Lemi IP is engaged in apparel and textile technology which was erected in two phases by foreign and local investors, involving private or public-private partnership profit making enterprise (Negarit, 2015).

In this thesis study paper; the nature, status and prospects of knowledge and technology transfer in Ethiopian IP is investigated from different view of perspectives. Even if the knowledge and technology transfer issue is a through process work and a vast field of study which varies and grows as per the nature of the coming technologies, this research begins with a slight introduction about the study background and then continuous by defining and understanding the current behavior of practical problem of KTT in order to frame up the flow of the study. Research questions are the theme of the study in which everybody raises whenever think about KTT. In addition, those questions helps in designing the interviews and other data collection methodologies in searching for the detail of the problem and discussing the implications.

2.17. Literature gap

In research, the solution made for a specific problem today may happen as a problem in another area of study. That is why we call research, due to the newness of problems in the eye of researchers. The solutions given yesterday on observed knowledge and technology transfer problems may not be functional for today's shortcomings in the field and the same works for the future. This is because the nature of the problems differs as per the level of knowledge and technology of each period's innovation and the solutions must consider and fits to this feature.

In previous periods, the main difficulty was to get access of knowledge and technology, meaning the source. This occasion is simplified due to globalization and anyone can access it. Indeed, each period of technological revolution have its own problem and solutions which have been made based on the requirements. The coming strategy, industrialization and trade relations across the world, overcomes the next headache of countries in finding the road to go through the source of knowledge and technology.

In this day, the concern shifts to find the optimized way of knowledge and technology transfer and effective utilization of the transferred knowledge and technology. As briefed in the literature survey above. A big deal of investigation have been and is being done on knowledge and

technology transfer throughout the world including Ethiopia (Khan, 2011). Due to the nature of the study, it needs updated information and new way of addressing the issues which are different in time. Majority of the literatures reviewed in this paper discusses about channels, factors and responsible bodies (actors) of knowledge and technology transfer in a separate way. Each of these elements of KTT have a relation and one depends on the other. For this reason, the solution recommended for the single element cannot solve the overall problem of knowledge and technology transfer process.

As can be referred from the literature review, some researchers such as (Perkins, 2012) indicates us to use methods of knowledge and technology transfer in an effective way, but it remains limited to the issues related to actors and actions which have their own significant impact over knowledge & technology transfer. To the same way, others as (Habib, 2016) tries to overcome problems associated with actions of knowledge and technology transfer, but the methods and actors were not addressed well yet. In this regard, putting all the efforts in acting to transfer knowledge and technology without installing an appropriate structure of actors and using the right and best sweated method of knowledge and technology transfer may left fruitless. Factors on the other side have a negative role on the effective use of these three determinants of KTT and have to be illuminated or minimized. All the models, conceptual frameworks, and action planes recommended by the literatures tried to solve the problems raised in their study separately. However, commonly lacks to integrate the methods, actors and actions of knowledge and technology transfer which becomes a prominent view.

In assessing the works done along knowledge and technology transfer, points left unaddressed and uncovered issues are identified in this paper. The main purpose of this study is to fill the observed and identified research gaps over the flied of knowledge and technology transfer. The main research gap identified in this paper can be stated in bold as “a means of integrating the methods, the actors and the actions minimizing factors of knowledge and technology transfer is left untouched still”. By the end, having reviewed literatures and identifying the gaps, this thesis is looking in to an effective conceptual framework with guideline to address the gaps observed yet and enables industrial parks to benchmark knowledge and technology from the existed technology practices.

Chapter three

Methodology of the study

3.1. Introduction

Research methodology is a plan for a study, providing the overall framework for collecting data or a plan for selecting subjects, research sites, and data collection procedures to answer the research question(s). It is a strategic framework for action that serves as a bridge between research questions and the execution, or implementation of the research strategy. Furthermore, research methodology is a part of paper which can help to see the nature and feature of the document which answer the questions of the how, what and why by clarifying the process to follow in the research, the tools and techniques to use to collect and analyze the data, the type of data going to collect, indicating the type the research and other issues related to the work (Kumar R. , 2011).

As per the description above, in this chapter, the audiences are given a clue about the methods and methodology in which this research is built and organized. The study site and the criteria to select that specific area is briefed. Type of sources for the required data, data collection tool selection which can fit to the sources and the target area to collect the required data is also discussed. Means of data discussion and analysis, formulation of finding and type of framework to develop is indicated in this chapter.

In general, this part gives detail about the route from where to where be the paper goes and it clearly shows the starting, the middle and finishing frame of the study. The general structural framework of the study is shown at the last page of the methodology.

3.2. Method of data collection

3.2.1. Primary sources

3.2.1.1. Questionnaire

All the necessary questionnaire was designed taking time and distributed to the desired place where the required data is expected to be available. It was put in to request to answer by selected company general managers and officers in selected company like training office, maintenance department, quality department and human resource office. Apart from this, questionnaire was being forwarded to industry park management, Ethiopian investment commission office, Industry Park Development Corporation and industry minister separately. Unfortunately, most of the questionnaire distributed didn't return back at the time of request. However, necessary descriptive analysis is made using the available questionnaire in hand. The rest and most important data was gathered in the following methods.

3.2.1.2. Interview

To cover a better number of respondents, structured & unstructured inter-personal interview was conducted. Draft guideline of interview is prepared in order to save working time of respondents as well as other bodies accordingly. In addition, it helps to raise many questions as much as possible in a short, precise and open communication channel, to shorten the data collection time and to get most reliable data from the required points of view.

3.2.1.3. Focus group discussion and email communication

Is held with different personals at different hierarchical level to fill the gaps of missing data from questionnaire and slight interviews. Bole Lemi Industry park management, Bole Lemi industry park investment commission office, IPDC human resource heads & training officer, Ethiopian investment commission head office (industrial parks project affairs office) and industry minister (university-industry linkage office) are discussed partially to clear points further. It is also a typical tool to go through the detail of the issue which needs elaboration and repeated explanation. For places and persons which were apart, email communication was used to get the relevant data on the issues required.

3.2.1.4. Consultancy from advisers & other expertise

For the whole study procedure in this paper, sitting down with advisors and conducting important discussions around whatever the issue is coming to mind was the repeated activity so as to draw the road for the coming works. Other researchers and scholars available here around and who did similar works based on the issue raised by this paper were also further information sources and plays a role in framing this paper.

3.2.2. Secondary sources

3.2.2.1. Literature survey

In this section, home study on books, thesis works, articles, term projects, reports on conferences, meetings were surveyed to know what was done on the issue related to this work by sing key words like knowledge & technology transfer, role of KTT, channels of KTT, methods of KTT, action in KTT, actors of KTT and success factors in KTT. All the references listed in the document are used properly to identify the gap on the issue. By doing so, it has been found significant in making clear the direction of this paper for:-

What specific path to follow,
What methodology to use to collect and analyze data
How to address the problem and
How to formulate the finding as a solution for the problem raised at the starting.

3.3. Target groups for data collection and discussion

Industry minister, the one who needs and is expecting of this issue as to be investigated, is used as one input in clarifying the existed status of KTT as nation wise in general and as an Industry Park in specific. Science and technology minister (investment commission sector) is also part of this work as of source of data. Through then, Industry Park Development Corporation is used as the near and reliable source of required data and as a directive force of this work to fly in to the solution for the stated problem. Bole Lemi industrial park management were the gate and facilitators for this work to be accomplished as of expected. Core functional management areas in individual companies like as Training offices, production heads, quality inspectors, maintenance

departments, HR managers … were stepping stones in collecting all the required and relevant data concerning knowledge and technology transfer.

3.4. Structural view of research methodology

All the words putdown above to explain the methodology 'how the work is going to be done' can be summarized as follows in the figure.

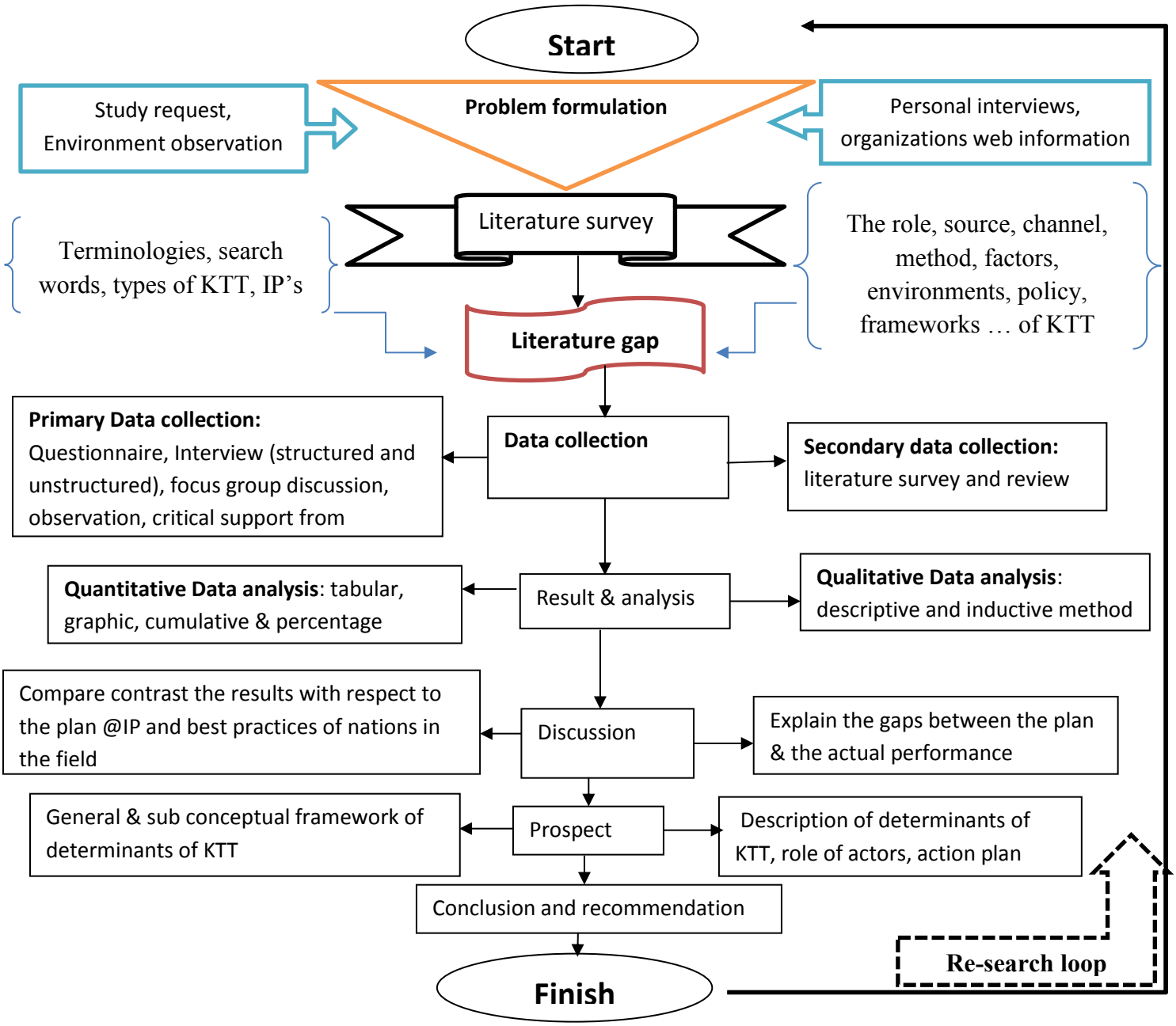

Figure *3. 1* Research Methodology Figurative Presentation: Source (Own Figure)

3.5. Study area selection and Sampling technique

Selection of study area is based on the request of the park management. During proposal development the researcher were informed as there is a need of investigation over knowledge & technology transfer in industrial parks. Specially, Bole Lemi Industry Park keeps in contact with Addis Ababa University in seeking consultancy regarding the issue. Based on this background, Bole Lemi Industry Park is selected as a specific area to conduct this research.

The nature of Bole Lemi Industry Park is the base to select and set the sampling mechanism in the data collection process. During observation of the park, the information from the park management introduces the researcher with the general feature of the park including the countries involved in the park investment and sector of manufacturing. Of total, there are 20 shades which are ready for investors and 11 of them are active/operational till this time. One investor from one home country covers more than 3 shades with the same or different manufacturing sector. Most of the investors are engaged in textile and apparel industry. Due to this nature of the park, the behavior of the data from all industries are related and it was necessary to take time to select representative sample of companies in the industry park to get reliable information. Systematic or user defined sampling technique was used to address the appropriate places and groups in the study area. In addition, other governmental offices was taken in partial considering the offices that are related with the issue raised in this study.

Data collection process covers all the following type of questions and target areas. Questions were designed considering the role and responsibility of each target area.

- Aim of the company to invest here in Ethiopia
- Academic Profile of employee in the company
- Type of contract with the host country government (Ethiopia)
- Time last here in production
- Means of performance measurement of the company
- Rate of labor turnover
- Rate of labor job satisfaction

Labors in companies

Specific areas in which knowledge and technology can be walkthrough are invited to participate in data collection process. Human resource heads, training center officials, quality department, maintenance staff heads and the like have been involved in trying to investigate the nature of knowledge and technology transfer in the industry park. Data obtained from each offices and individuals asked includes like:-

- Employee profile (academic and experience)
- Work experience there in the company
- Responsibility and duty
- Type of knowledge and technology gained in staying there
- Factors affecting knowledge and technology transfer in the company
- knowledge and technology transfer activities in the company
- knowledge and technology transfer mechanisms used in the company
- Rate of labor job satisfaction

Industry park management office

- Level of educated employees in the company
- knowledge and technology transfer plans
- Arrangement of knowledge and technology transfer acting centers
- Frequency of knowledge and technology transfer activities
- knowledge and technology transfer effectiveness measurement parameters
- Mode of knowledge and technology transfer

Industry Park Development Corporation; IPDC

- Proclamations and regulations regarding knowledge and technology transfer
- Type of agreements made between home and host countries
- Mode of knowledge and technology transfer agreements with investors
- Core activities manipulated by the office to transfer knowledge and technology
- Identified actors (participants) in transferring knowledge and technology
- Relations between those identified actors in doing so

Investment commission (@Bole Lemi)

- Role and duties of Ethiopian investment commission at industry parks
- Upper and lower responsible bodies in knowledge and technology transfer
- Methods used to acquire the available knowledge and technology from the foreign companies
- Inceptives and promotions in making knowledge and technology transfer better
- Powerful factors that tackle knowledge and technology transfer difficult in case of Ethiopia (Bole Lemi industry park)
- Means of following the performance of knowledge and technology transfer activity

Investment commission (head office)

- Role and duties of the office at country level
- Specific tasks given to this office in industry parks
- Relation channel with other responsible bodies in transferring knowledge and technology
- Works done in industrial parks to transfer knowledge and technology owned by investors
- Follow-up methods to insure knowledge and technology transfer as stated by the policy and proclamations.

3.6. Method of data analysis

Qualitative method of data analysis: - Descriptive type of data analysis is used to present and interpret the data obtained. To handle properly the responses from interviews, target group and personal discussions relative explanation is used to investigate policy and regulations towards knowledge and technology transfer.

Quantitative method of data analysis: Tabular & graphic methods are utilized to present the results form questionnaire & to show the level of measurements over the presence of knowledge & technology transfer methods, effectiveness of the policy over KTT transfer, the satisfaction of labors by the methods used to transfer K & T. Out of 45 questionnaires distributed between different responsible bodies, 26 were bring back. Only those questions which are responded properly were used for analysis for the sake of correctness.

Chapter four

Result and Discussion

4.1. Introduction

As the title indicates, result and discussion is the place where results of the study are presented and discussion is held with reference to the aim of the research by using the planned tools and means of data interpretation in the methodology of the study. The rough data and all sort of information's are organized as to be easy and important to discuss along the objective set in the first chapter of the research. Data result presentation shall start with introducing the nature of the study area. In this chapter, all the data collection result is presented first and then discussed accordingly.

The data presentations and discussion flow in this paper is organized in the order of the methods, actors, actions and then factors of knowledge and technology transfer. Discussion of the mentioned elements follows the presentation of results about each part. Before going to the detail of data result presentation, let's introduce with the companies in the Bole Lemi Industry Park.

4.1.1. Nature of Companies in the Industry Park

Bole Lemi Industry Park is the first industry park in Ethiopia. It lasts about four years since started and it is now one site of Ethiopian Industrial Park which creates job opportunity for thousands of local labors and generating foreign currency for the country. In Bole Lemi Industry Park there are around 20 shades in which about 11 are already operational. Investors are from different home countries; china (3 shades), India (3 shades) and South Korea (3 shades), Singapore (1) and Taiwan (1), as shown in the table below. They are involved in apparel, textile and leather production. Of those, about 5 shades are addressed in data collection process considering different home country and manufacturing sector. The table below shows some detail of this paragraph.

Table 4. 1 List of Companies in Bole-Lemi Industrial Park

S.No	Company name	Home country	Investment sector	
1	New wide Garment Ethiopia Branch Company	Singapore	Garment	
2	George Shoe Ethiopia Pl c.	Taiwan	Leather shoe	
3	Shunts ETP Garments PLC	South Korea	Garment	
4	ARVIND Lifestyle Apparel Africa PLC (ANF GULF)	India	Garment	
5	Vestis Garment production PLC	India	Garment	
6	JAY JAY Garment PLC	India	Garment	
7	LYU SHOUTAO Factory Plc.	China	leather hand glove	
8	EVERTOP Sports Wear PLC	South Korea	Garment	
9	C & H Garments PLC	China	Garment	
10	KEI Industrial Engineering Consultancy PLC	South Korea	Garment	
11	Ashton Apparel Manufacturing PLC	China	Garment	

Source: Ethiopian investment commission

4.2. Result presentation and discussion related to method of knowledge and technology transfer

4.2.1. Presentation: methods

In this section, all the attempts and trials of knowledge & technology in the industry park are considered. Since stated, the park recruits foreign expats to train the local labors to substitute the foreigners by local human resource after three years. Depend on this plan, there is a skill transfer form practiced in companies on the behalf of investment office. Here are two types of tables which represents the training report format and skill transfer format respectively.

Table 4. 2 Local workers training report form by foreign expatriates during the renewal of work permit

S.no	Name of the trainer (expatriate)	Position of the trainer (expatriate)	List of the trainee(local workers)	Title of training	Status of the trainee	Remark
1	Mr. y	Merchandiser	Mr. X	Merchandiser	good	

Table 4. 3 Skill transfer format in bole Lemi Industry Park

Skill transfer format						
Name of the company ….						
Name of the trainer and position (expatriate)						
Name of the trainee	Mobile/Email	Skill to be trained	Period to finish the training	remark	Trainee's signature	

Source: Ethiopian investment commission; bole Lemi industry park office

A discussion held with the investment commission office assigned at Bole Lemi Industry Park indicates that all the training requirement and the content of trainings is designed by the foreign expertise on the request of the company owners.

Training coordinators at the industry park management level is mostly concerned on scheduling routine trainings at every new labor entry (hiring phase) based on the desire of the companies. The system follows training for daily consumption of the companies rather not for transferring knowledge and technology so as to develop technology based human resource in sighting the future.

As indicated above in the table 1 and 2, it was observed that foreign experts recruited on the behalf of the company owners makes a contract with the industry park management by the side of investment commission office. The contract is made for 3 years on average. But almost all foreign expertise request for extension of the contract mentioning the reason like "not transferring the required knowledge and technology in the time given before".

As the information gained from technical professionals, they have mentioned some reasons for being dissatisfied in their job while staying there. One and most weighted reason is they are not free to own the available and required knowledge and technology as per the job needs. Because, most employees in these companies are done to engage in training only for routine activities. Absence of well-organized center of training and training equipment is considered as a critical problem. Due to this, they haven't care to own sustainable knowledge and technology as a mental property which can be utilized anywhere in the future.

The percentage tables presented below shows the absence and presence of the methods of knowledge and technology transfer. The percentage shows the no and yes percent of respondents over the question. Each table contains one method of knowledge and technology transfer and the response is subjected to that method written on top of the table.

Table 4. 4 Knowledge and Technology Transfer Methods Availability Measure

Presence of the method	After action review		Best practice		Documentation process		Internship		Expert review		Knowledge audit		Job aid	
	frequency	Percent	frequency	Percent	Frequency	Percent	frequency	Percent	frequency	Percent	frequency	Percent	frequency	Percent
No	20	76.9	15	57.7	15	57.7	14	53.8	16	61.5	18	69.2	16	61.5
Yes	6	23.1	11	42.3	11	42.3	12	46.2	10	38.5	8	30.8	10	38.5
Total	26	100	26	100	26	100	26	100	26	100	26	100	26	100

Table 4. 5 Knowledge and Technology Transfer Methods Availability Measure

Presence of the method	Knowledge inventory		On the job training		Learning games		mentoring		Story telling		training	
	Frequency	Percent	frequency	Percent	Frequency	Percent	frequency	Percent	frequency	Percent	frequency	Percent
No	20	76.9	15	57.7	15	57.7	14	53.8	20	76.9	15	57.7
Yes	6	23.1	11	42.3	11	42.3	12	46.2	6	23.1	11	42.3
Total	26	100	26	100	26	100	26	100	26	100	26	100

Source: writer data analysis

The data from Ethiopian investment commission shows the labor hiring and firing rate in each month as presented in the table below. It is observed that there is a high labor turnover rate especially after training in all companies. Even, another reason for expats to request extension of contract is that to train a new employee so as to replace the lost employees trained in the last periods. The first table shows single company labor turnover rate whereas the second table presents labor turnover rate as a whole park, bole Lemi.

Table 4. 6. Individual Company Labor Data Sample

George Shoe IP							
Months	**New**	**Resigned**	**Male**	**Female**	**Total**	**Expats**	**Turnover**
July	59	23	518	317	835		3%
August	51	5	559	322	881		1%
September	23	4	567	333	900		1%
October	-	-	400	260	660		0
November	28	9	125	125	250		4%
December	62	15	151	129	280		6%
January	44	14	183	167	350		4%
February	-	5	169	155	324	46	2%
March	75	62	198	167	365	40	17%
April	86	59	254	172	426	51	14%
May	107	15	239	159	398	49	4%
June	7	43	276	22	298	64	15%

Source: Ethiopian investment commission

Table 4.7. Bole Lemi Industry Park Labor Data

Months	New	Resigned	Male	Female	Total	Expats	Turnover
July	1,405	735	1,622	11,574	13,196		6%
August	960	1,081	1,732	11,343	13,075		8%
September	1,375	1,273	2,193	10,984	13,177		10%
October	2,158	1,606	1,924	11,823	13,747		12%
November	1,139	1,487	1,724	11,989	13,713		11%
December	1,305	988	1,790	12,535	14,325		7%
January	782	1,144	1,678	11,632	13,310		8%
February	1,505	1,686	1,794	12,552	14,346		12%
March	1,651	1,012	1,872	13,002	14,874	309	7%
April	1,222	1,108	1,788	12,767	14,555	304	8%
May	1,431	1,665	1,779	13,180	14,959	318	11%
June	1,204	1,283	1,768	13,018	14,786	309	9%

Source: Ethiopian investment commission

To the parallel system of analysis, the benefit gained from the presence of knowledge and technology transfer methods/training was questioned and interviewed across the labors of the company at different level. The frequency table presented below shows the level of satisfaction

measurement across the 26 respondents. The frequency tells us the number of respondents with respect to each satisfaction level and the percentage is about the weight of the level between the respondents.

Table 4.8. Measure of Satisfaction from Training and other knowledge and technology transfer methods

Range of change	**Inter-personal communication**		**Competency level**		**Production quality**		**Doing new on the job**		**Money making capacity**		**Extra qualification**	
	frequency	Percent	frequency	Percent	frequency	Percent	frequency	Percent	frequency	Percent	Frequenc y	Percent
Not at all	1	3.8	4	15.4	2	7.7	4	15.4	5	19.2	8	30.8
Not satisfactory	10	38.5	7	26.9	8	30.8	15	57.7	12	46.2	10	38.5
Good	11	42.3	10	38.5	9	34.6	2	7.7	6	23.1	7	26.9
Very good	3	11.5	5	19.2	6	23.1	4	15.4	3	11.5	1	3.8
Excellent	1	3.8	4	15.4	1	3.8	1	3.8	5	19.2	8	30.8
Total	26	100	26	100	26	100	26	100	26	100	26	100

Source: the writer data analysis

Again, training office in the IPDC assures that training contents and schedules are not centering industrial parks to transfer knowledge and technology. The office prepares training for anybody who needs training as per the requirement of the seeker. Here it is clear that knowledge and technology comes with investors are not given emphasis and it is left as to come and go with the owners. Interview and short discussion with company employees like training office coordinators, maintenance officers, technicians and quality inspectors indicates that the contribution of IPDC in preparing and delivering skill based training is not equivalent with the requirement, which can help in transferring KT. Almost all soft and hard skill training is conducted by the companies as an induction. This makes the employees to not utilize their effort in absorbing KT on utilization in the working environment.

For the question of presence of knowledge and technology transfer center in bole Lemi industrial park, respondents for answers no and yes are leveled and presented in the histogram shown below.

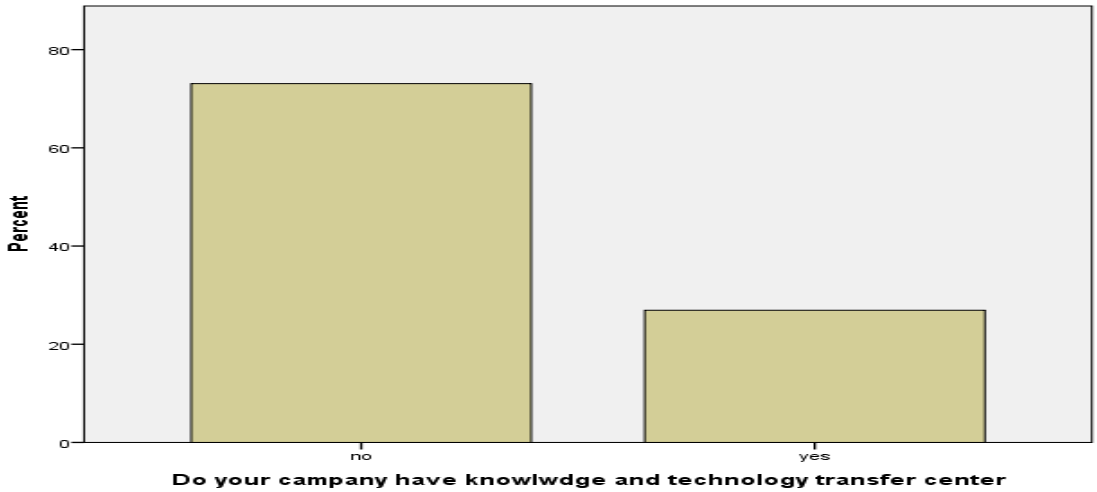

Figure 4. 1 Measure of knowledge and technology transfer Center in BLIP

4.2.2. Agreements

In this research process, the system and type of agreements have been checked-out from investment commission. Actually it refers industries which are installed in and out of industry parks, but the system works for all occasions.

Table 4. 9. Foreign and Domestic Investment Agreement Form

No	Form of Ownership	Nationality of supplier	Main Business Activity	Title of the Agreement	General Description of the Agreement
1	Foreign	Belgium	Operational and Licensing of Hotels	Management Agreement	License agreement, Sheraton reservation service contract and management agreement together comprising the management & operation
2	Domestic	UAE	Trading In Industrial Plant Equipment and Spare parts	Operational Management Contract	Operation management plant operation optimization organizational management plant maintenance, rehabilitation, expansion and quality improvement
3	Joint With Domestic	Germany	Planning, Implementing, Operation of Modern Extraction Industry	Special Instant Coffee Processing Technology	Development, installation and setting in to operation of instant and ground vacuum coffee industry

4	Domestic	American	The Transfer of Technology - Technology Transfer Pertaining Specifically to Logistical Management of Packaged Tours and Their Marketing	Management of Contract for Experience Ethiopia Travel	Provision of Services Which include Management, Marketing Product Strategy and Technology Transfer Specially to Logistical Management of Packaged Tours and their Marketing
5	Joint Venture	Belgian	Manufacturing of Beer and Advice Service in the Field of Brewery Operational Management	Advice Service Agreement	Bock hold Will Provide its Technical Advisory Services in the field of Brewery Construction and Operational Management to Zebidar Brewery as set in the Service Agreement
6	Joint Venture	Tanzanian	Manufacturing of Body Cares and Oval Cares	Transfer of Knowledge in Relation to Product Manufacturing Process	Provide technical on expertise to the company and upgrading the existing cosmetics factory
7	Joint With Domestic	South African	IT Consultancy Services	IT Supply Support and Maintenance Services	Providing network installation software maintenance, work flow analysis, site assessment, site data management and statement integration service
8	Joint With Domestic	UAE	Supply Technical, Management Administrative Service	Technical, divisional office administration and employment secondment services	Providing planning accounting legal, tax, operational, financial, treasury, budgeting warehousing, marketing, procurement production and other related service
9	Foreign	Indian	Manufacturing of Paints	Paints and Paints Related	Provide know-How & Technical Support to Produce the Various Paints
10	Foreign	German	Know How Transfer in Production of Biogas Utilities	Know How Transfer In production of Biogas Utilities	Mobile Biogas Technology
11	Foreign	Britain	Business Activities Listed Under Article of Vefp Hold CO.LTD 's MOA	International Know How and technical Support for Biscuit Manufacturing	Assist with Sourcing & Providing With Relevant International Experience in Marketing Strategy & Strategy Planning Identification of Product Types and Products Development and Recipe Development

12	Foreign	Israeli	Agriculture/Farming	Agricultural Management	To Implement and Transfer Modern Israeli Agricultural Technology to Uni fruit Limited (Ethiopia Branch) in Tigray Region
13	Domestic	Dutch	Hotel Management	Hotel Management Agreement	Hotel Management Agreement
14	Joint Venture	Mauritius	Financial Services	Planning New Product Development & Innovation	Catalyst will Provide technical Expertise to yes brands on Optimization of the existing factory, Innovation of new Products and Training and Development Programs in Order for the productions and Operations to meet Global best Practices
15	Joint Venture	South Africa	Information Technology Supply Support and Maintenance Service	Information Technology Supply Support and Maintenance Service	Information Technology Supply Support and Maintenance Service
16	Joint Venture	Italy	Whole Sale of Leather ,Row and Prepared Skin	Leather Processing Technology	Avail Processing Technology to Upgrade Leather Processing Capacity
17	Domestic	American	Providing Non-Medical personal assistance services & care to elderly and infant clients	Master territory rights franchise agreement (Caring senior citizens)	Providing non-medical care for senior citizens & infirm (personal care, meal preparation transportation, house, companionship etc.)
18	Joint With Domestic	Chinese	Car Manufacturing, Assembly Sales & Service	Lifan 520 Technic Transfer Contract	
19	Joint Venture	Geneva	International Beverage personal Assistance	Technical and Management Assistant	IBPA will provide BGI Ethiopia with all Advice and assistance the BGI Ethiopia may Request for the better management of Business
20	Domestic	Kenyan	Consultancy Tea & Coffee Trade	Non-Equity collaboration management contract	Manage chewaka tea farm, tea factory, packing factory, ensure export target, management & administration of tea business
21	Domestic	Indian	Tea growing & marketing	Non-equity collaboration management control agreement	Mange &Administer tea farm & tea factory provide production & export marketing knowhow and ensure 100% export target

22	Domestic	American	Mobile marketing & advertising	Mobile outdoor advertising	Franchise pounding outdoor advertising by introducing a program of portable, patented, truck-mounted and platform mounted
23	Foreign	Netherlands	technical and Business Consultancy Services	Technical Assistance Corporate Know-How and Employment Secondement Service	Supply of Corporate Know How Services ,Employee Secondement Services and technical Assistance Services
24	Foreign	Netherlands	Technical and Business Consultancy Services	Technical Assistance Corporate Know-How and Employment Secondement Service	Supply of Corporate Know How Services ,Employee Secondement Services and Technical Assistance Services
25	Foreign	Ireland	Mobile Technology Provider	Comvalt Software License Agreement	Software License for the use of the Comvalt Software Plat Form to Deliver Services to Customers in Ethiopia
26	Foreign	Netherlands	Technical and Business Consultancy Services	Technical Assistance Corporate Know-How and Employment Second net Service	Supply of Corporate Know How Services ,Employee Secondement Services and Technical Assistance Services
27	Foreign	South Africa	Glass Manufacturing	Knowledge and Knowhow transfer for the Manufacturing of Glass and Glassware	Provision of Systemic knowledge for Manufacturing of Products as well as Design, Technical upgrading and/or Operation of production Facility for the Existing glass Factory
28	Joint Venture	Mauritius	Business organization	Technical and management assistance agreement	Duncannon consulting services will provide technical & management assistant for Awash Wine Tyege S.C with all in advance & assistance for Awash Wine Tyeg S.C based on their request for the better management of the business

Source: Ethiopian investment commission head office

In addition to this, the discussion held with the parks management and other respective bodies in Industry Park Development Corporation, Ethiopian investment commission and industry minister,

have been resulted to the information like the relation between investors form home countries and the host country Ethiopia mainly concerns on trade relation which they assume as to increase foreign currency, to create job opportunity and economic contribution. Result of respondents on this issue from the questionnaire is shown in the figure below.

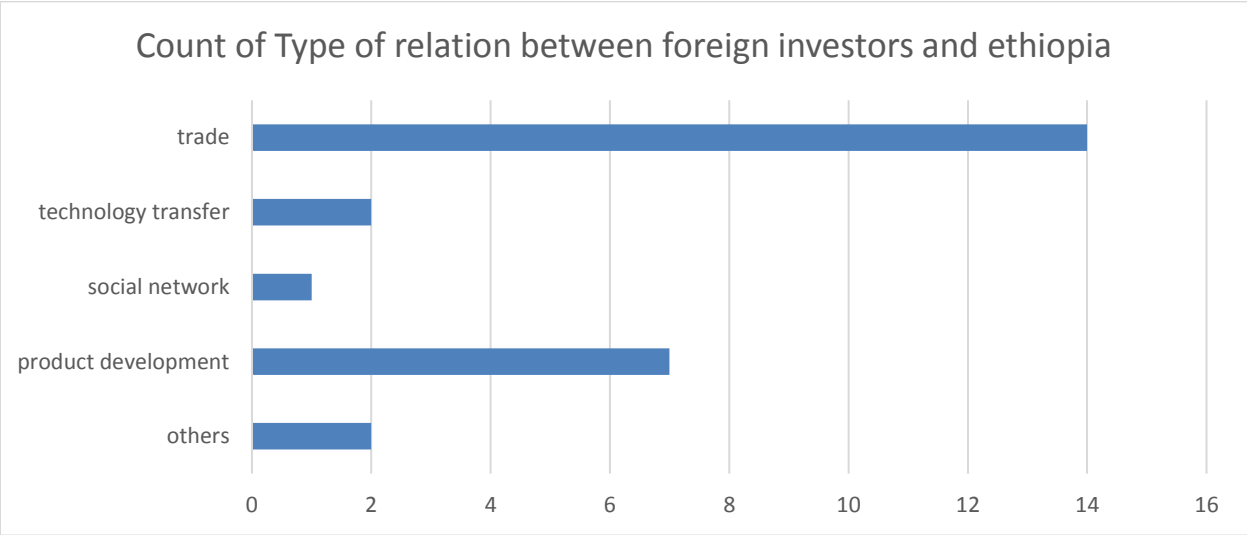

Figure 4. 2 relation of foreign investors with Ethiopia

As have had interview and discussion with identified bodies concerning industrial parks, the real problems with KTT are not related with the policy merely. Rather they have faced problems with the right link and communication between the policy executers and execution bodies. The objective of industrial parks Development Corporation regarding industrial parks also mentioned as boost industrial parks development through the highest standards of professionalism, to drive industrialization, promote exports and create employment opportunity there by the countries development goal will achieve the middle level income status.

4.2.3. Discussion: methods

As has been explored in the literature survey, in the history of technological development throughout the world, most countries undergo with the research and development activity prior to foreign direct investment. This technique helps those countries to attract local peoples towards technological activity through then they build a huge technology rich man power. While others come up with foreign direct investment as a means of technological development for economic revolution. Ethiopia is also experiencing foreign direct investment as an economic policy. In this

policy, IP development have been given an emphasis as of the trend of some near developed countries.

Companies in bole Lemi Industry Park mainly accomplish daily routine activities for the sake of producing enough products to generate currency. To do so, there must be preliminary requests fulfilled as like skilled labors. This point pull-up the issue called knowledge and technology transfer from the source to the demanders. In almost all companies surveyed under this research, R & D center is not installed at all. Likewise training is conducted informally whenever there is a new employee. There is no regular parameter to say the transfer level as good or not good which enables to measure the status of the trainee after completion of the training.

No body interferes in the side of the host country, Ethiopia, to adjust the required training considering the knowledge and technology equipped by these investors and the need of Ethiopia. Here, the interaction between concerned bodies is missed in designing the method to transfer knowledge and technology.

It is visible and almost accepted that knowledge and technology transfer methods are the train for the process. Nothing can be done with the process and it seems a blind road unless using the right method of knowledge and technology transfer. All the results whether good or bad, is attained through the implementation of KTT methods to develop fertilized environment of technological development in a country whom wants an economic change. Every country which undergone in technological innovation passes in one or the other method of knowledge and technology transfer based on the effectiveness of the method and the behavior of the technology with respect to the need of the region.

Effectiveness of these knowledge and technology transfer methods can be insured if the participants in the process of KTT are found to be capable. In our case, not only the effectiveness of the methods, but using these methods of knowledge and technology transfer is not insured yet in bole Lemi industrial parks. The above table percentage analysis shows us that knowledge and technology transfer methods are not used on average around 63%. Even the respondents are in vague about most of the knowledge and technology transfer methods mentioned. We can see that training, which is the most familiar method of knowledge and technology transfer in most

countries, is not even implemented well in the IP/the absence rate of training as a method of knowledge and technology transfer is 57.7%. Most of the time training is used as an induction tool rather than the method of transferring the physical K&T. it is arguable that in the manner of which knowledge and technology transfer methods are not utilized well, knowledge and technology transfer would not be available. Or it can be said knowledge and technology transfer is in its infant stage in industrial parks in Ethiopia. Actors can conduct activities to transfer knowledge and technology if only knowledge and technology transfer methods are available and ready as a ground to plat KTT.

On the other hand, the table which presents labor turnover rate indicates us as there is a labor displacement each month. This is a critical issue in that if labors are leaving the company after training, it is a wastage in both technology and currency. Either the government or companies have been invested on those labors in qualifying with the required K&T in their stay there in the company they have hired. In this case, there is a big gap in understanding the role of foreign investment in transferring knowledge and technology. If once labors resign the company after they have taken training over the required knowledge and technology, the government needs to utilize those fertilized human resources in other local governmental or private manufacturing sectors and manufacturing based training institutions as an additional effort to diffuse knowledge and technology. Spinning out the company is one of the action in KTT which can be done through this way (by labor movement form the source of K&T to the region of transferee). So Ethiopian government can install an identical company by using these labors moved out from the IP companies that can replace the foreign investment by generating the same or relative currency income in foreign market. All these gaps implies the failures or absence of KTT methods/channels in the industry parks.

Based on the result on the last table which presents the satisfaction level of employees in knowledge and technology transfer methods/training, all the measurement parameters used to level the effectiveness of training in the industry park indicates that most of the trainees on average (> 55%) are not satisfactory or no changes at all on their capacity by being trained. Specially, the satisfactory analysis indicate that those of employees who works in training, quality, maintenance

and other technical positions are discouraged in KTT activities. The following figure can show this clearly.

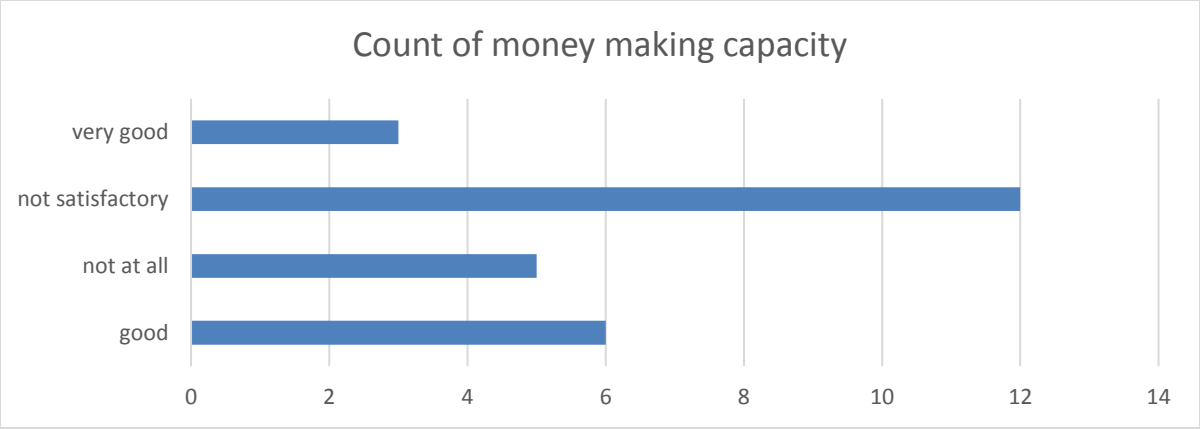

Figure 4. 3 single measurement on satisfaction level of employees from knowledge & technology transfer activity

We have seen that for the question of the presence of knowledge and technology transfer in the industry park, the respondents are below 25%. This insures that the knowledge and technology transfer is not given a concern by the industry park as well as by the government. Here it become, the policy says many things on the paper, but does nothing on the ground.

4.2.4. Discussion: Agreement

Agreement is the type of method/channel of knowledge and technology transfer which is related to forced technology transfer. It is expected that each and every company engaged in agreement with the host country have had the obligation to perform all the listed tasks in the agreement as a mutual benefit. China experiences this type of technology transfer in the development strategies of the country. Actually, It is implementable and somewhat is result oriented action that can be accomplished on the behalf of the host/investing country.

As shown in the table above, type of knowledge and technology that is planned to transfer is already identified and is promised by the investors which sign the agreement. It is one step in processing KTT from the source to the recipients. In history of most of the nearly developed countries, identifying the critical knowledge and technology which are assumed to be important and significant for progressive development stated in their technological strategy is the first stage

of going through technology transfer plan prior to inviting investors. The system is normally traced in to Ethiopia, via the 5 year transformational growth plan.

Once signed the agreement, nobody knows doesn't have an accurate data for questions like what KT is transferred, when and how it is transferred, where is located the transferred knowledge and technology, who is utilizing the transferred KT and so on. There is no an accountability and clear word of asking the investors for not KT in the signed agreement. By any means, if those investors decide to leave Ethiopia, all the technology and related innovation goal of Ethiopia would also stop there. Because there is no rule and regulation to enforce these investors to sell or transfer technology in their stay and before they leave the country. This is how the policy fails and it leads to loosing several resources and capacities which was invested in the area. So controlling and measurement frames should be installed by Ethiopia so as to ensure technology transfer before the contract of investors is being finished. Looking to another unhandled technological option is not feasible in releasing the occupied one.

Besides, it is to mean that there is a missed line in the structure that enables to see the line of implementation of the policy and the agreement at the execution level. Normally this type error would occur when policy is designed without a clear goal and the means to achieve the goal.

4.3. Result & discussion Actors of knowledge and technology transfer

4.3.1. Presentation

This research tries to identify the main participants of knowledge and technology transfer in Ethiopia via industrial parks. Questionnaires regarding the actors of knowledge and technology have not been answered well and were not found usable in the expected way. Rather information from semi-structured interviews and focus group discussion was the major inputs for this part of the research. The actors can be classified in to two groups; the lower level and upper level actors of knowledge and technology transfer. Based on the data form the survey, the lower level actors of knowledge and technology transfer includes the investors in industrial parks, the employees working there, the industry park management and investment commission office in the industry park, industry park development corporation, developmental institutes and the private sector as the whole. Whereas the upper level actors may hold the council of science and technology (which is

under the office of the prime minister), industry minister, science, technology and innovation minister, Ethiopian investment commission, universities and research and development offices.

The structural relation of each of the actors were put in to investigation in this research. The improvement held on STI policy focusing of manufacturing industry have made a scheme of structural network over the actors. The following figure can show a least previous typical organizational structure of knowledge and technology transfer actors and flow of works.

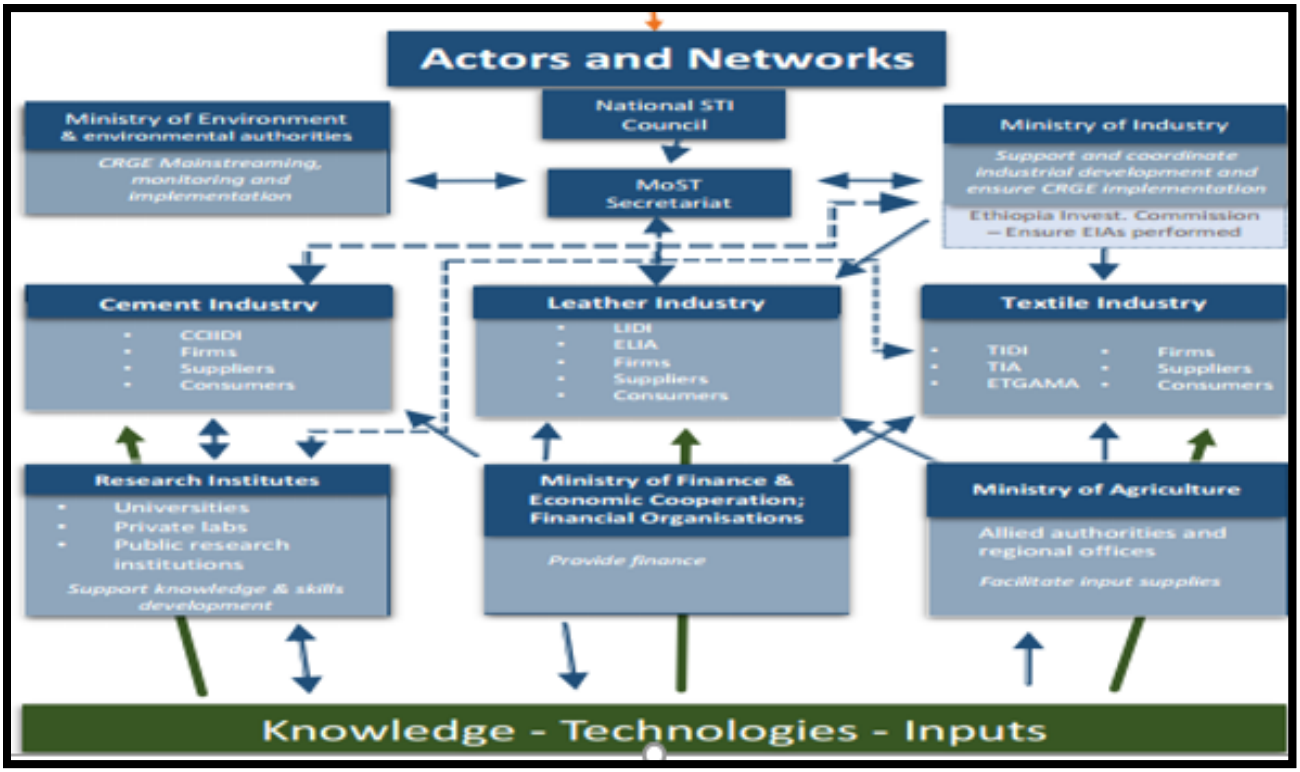

Figure 4. 4 Structure of The Sectoral Systems of Innovation: Source (Innovation for green industrialization-Ethiopia)

To the same context, the industry minister, which is assumed to be the top level actor of knowledge and technology transfer, have had the structural relation and network between the accountable bodies.

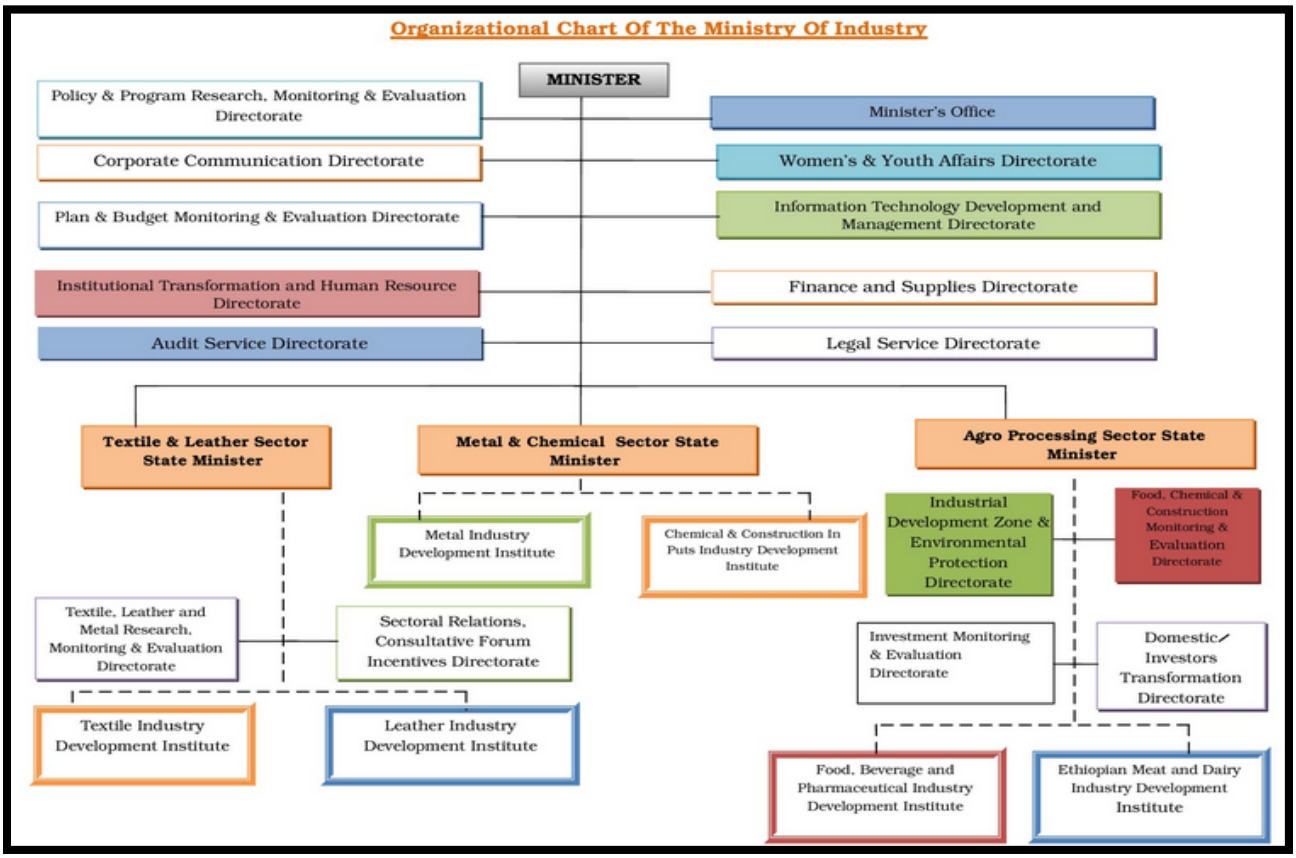

Figure 4. 5 Organizational Structure of Industry Minister: Source (Industry Minister)

As seen in the figure above, actors which are responsible for actions designed by industry minister and accountable for the minister are: leather industry development institute, textile industry development institute, metal industry development institute, chemical and constructions inputs industry development institute, food beverage and pharmaceutical industry development institute, meat and dairy industry development institute, federal small and medium manufacturing industry development agency and industry inputs development agency of Ethiopia. Here we can see that the linkages is all vertical in which no way of horizontal and equivalent communication channel between each actor of the minister.

The results found from interview, focus group discussion and further investigation in this study insures this fact again. Most of the actors in the structure addressed in the study (BLIP, IPDC, EiC, industry minister) have briefed me that the communication channel and cross-control mechanism is not working well in the structure and the absence of clear quest of actions and performance

measurement system affects the KTT strategy set in the policy. As per the information they have, there is a fussy structure, unclear distribution of workloads, misunderstanding and default interventions between the organizations set in to the system of KTT. Investment commission and IPDC are the main authorized actors in the structure in the government.

4.3.2. Discussion

Actors in this research perspective indicates governmental and private organizations which are installed so as to perform activities on knowledge and technology transfer. Actors are different in different countries based on the technological policy and structure of organizations arranged to execute the policy as per the direction in the policy. The size, shape and direction of these actors changes over time to meet the modern behavior of technology and the trend of KTT. In developed countries private sector is given a high place as an actor of knowledge and technology; for example, case of Israel. In such countries The R&D budget is not restricted to governmental actors, whereas it is opposite in developing one. The effectiveness and ease off knowledge and technology transfer is mainly depend on these actors performance. That is why countries are updating their technological development policy and strategy over the years in accordance with effective actors.

As of many countries, government is the running power of knowledge and technology in Ethiopia. It is sure to say that all the actors of knowledge and technology transfer in Ethiopia are fenced in the circle of governmental administration. On the other side, actors in the private sector are think over making more money without investing on K&T. due to this, the wishes and the practical works on KTT are far apart each other still in Ethiopia. Institutions, Commissions, corporations, boards, committees and more are available here in Ethiopia which are installed as an actor for the purpose of industrial operation and technological innovation. Proclamations and regulations are also issued following the expected role and duty of these organizations and set of actors. The arrangement and naming of KTT actors in Ethiopia have been changed many times as to make the system responsible and accountable to the duties assigned.

The horizontal measurement evaluation and correction actions are blocked and if the feedbacks are made to go top to the minister, it seems centralized system which have negative impact on the design, implementation and growth of technological innovation.

Indeed, absence of planned interaction of actors in the structure organizations installed for KTT matters the level and goodness of KTT at all. Employees in these structures are always in fussy for their relation with in the organizations because, inappropriate duplicated placement of tasks is common. This research tries to simplify those problems in designing better functional and clear framework to coordinate KTT determinants.

4.4. Result & discussion along Technology transfer via documentation

Documentation is method which have a long period experience of the world in transferring knowledge and technology to the next generation. In case of industrial parks, the system to handle the documentation process is not installed and documentation is not even considered as important that much. It was asked to assess the documentation process and the type of documents set in to a property, but critical points as like operation and maintenance manuals machines, the company production process, quality performance records, management skills, nature and type of knowledge and technology in companies … are in the hand of company owners/managers yet and are controlled closely by them.

Documentation of KT may include both soft and hard skill, knowledge and technologies which can be documented in audio video system, hard copy (paper or part of technology physically). Technologies like operation manual of machines, maintenance of machines, supply chain and marketing links, production and quality control systems, standards of products for export purpose, managerial techniques and so on can be documented following knowledge and technology transfer strategies of the host country

Documentation is through process action in which all the practical works can be documented. Ethiopia must benefit from Investments in documentation from all activities. Normally trainings and technical operations are the soft skill result of documentation. Documents is KT by its own but it will be said only if it is stored and utilized appropriately

4.5. Result & discussion concerned on actions of knowledge and technology transfer

4.5.1. Presentation

Actions or activities are assembly of tasks to be accomplished by the actors on the platform of implementation. It starts from policy preparation that can be implemented directly when released to actors in the hierarchy.

Policy: - it is the top level key action of economic development and knowledge and technology transfer. Policy needs reshuffling and result based drafting using the appropriate term of expression which ca be understandable by the executers and others who matters the effectiveness of KTT and development of the country. Policy is a field where a number of tasks are designed and placed to the actors so as to fulfill the gaps of the country by coaching international experiences. As said many times in this research, policy shouldn't confuse the executers and it must lead us to the expected result except process obstacles and fragment of gaps in executing the policy due to unexpected and unknown happenings.

Revised national policy of STI (national STI policy, 2012) mentions list of strategies to implement the policy over the technology transfer, human resource development, manufacturing sectors, research, financing and incentive schemes, national quality infrastructure, educational institutions, intellectual property system, science and technology information, environmental protection and development and international cooperation.

1. Import effective and appropriate foreign technologies and create capabilities of adaptation and utilization of these technologies in manufacturing and service providing enterprises;
2. A system to search, select, adapt, utilize as well as dispose imported technologies should be established and implemented;

3. Establish and implement a system to use FDI and other ways of supporting technology transfer;

4. Strengthen technology transfer among and between various manufacturing and service providing enterprises;

5. Strengthen wide use of intellectual propriety, standards and other related information in support of technology transfer.

The histogram below shows the level of measurement of the effectiveness of national policy on knowledge and technology transfer through industrial parks, bole Lemi. Among 26 respondents for this question, above 16 measures the policy as inefficient and around 7 of them graded it as low efficient. It counts only one respondent as very good and it goes inaccurate when compared to the overall respondents. The semi-structures interviews and focus group discussion held with different officials in the target groups listed in methodology insures that there is a gap in drafting the technological policy in which most of the time it goes to un implementable due to the realities on the ground.

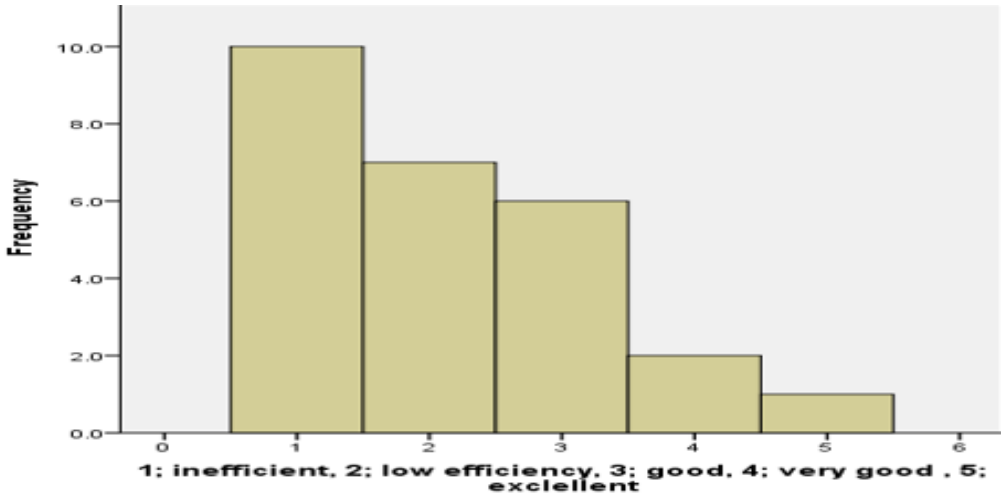

Figure 4. 6 Measure of Policy Effectiveness in knowledge and technology transfer

4.5.2. Discussion

Even if points which needs support have been identified, it didn't indicate technical and practical supporting frames. For example, let's see the gaps of implementation strategies presented above for technology transfer.

The first strategy is talking about importing technology and creating capability of adapting and utilization of technology. It doesn't clarify the technique of system of creating the capability of absorption and adapting the technology. So then everybody thinks about technology transfer any time, but can't be able to transfer the technology forever. See, Technology is imported via foreign investment. Well, then what is to be done to own that technology as a national property and as an economy? The policy must answer this question directly so that it will be a tool for to spillover

technology. Countries like Korea, India china and others which have developed technologically via the technology policy takes over a decision for what technology is needed and through what means to transfer on the policy draft. For the same case, the second strategy declares about establishment and implementation of a system to search, select, adapt, utilize as well as dispose imported technologies. Here the search and selection of technology seems given to other unknown bodies, rather it must be declared via the policy. Adaptation and utilization of the technology needs its own strategy which identifies the actions and responsible bodies as a placement/command. Unless and otherwise, no one knows that system which said to be established and it seems closed for the executers.

Financial support and funding strategy doesn't brief the way and amount of finance to support technology transfer activities. For example, in recently developed countries assessed in this research the governmental administration announces the budget policy of technology transfer. For that matter most of them foster the budget for R & D and technology transfer activities from the lower rate (2%) to 25% and then to 50% through periodic revised technology and innovation policy. Whereas in Ethiopia it was 0.24 in 2010 and 0.63 in 2013. This indicated us that emphasis is not given for technology transfer still. All in all, technology transfer policy should be clear, open and ready to act directly. As of the countries which have recent history in technological development, Ethiopian national technology policy should act as a direct and mandatory rule to spillover technology from foreign investment. (Tsegaye, 2015) (Science, tecnology and innovation policy, 2012). All other policy implementation strategies in the cited national policy of Ethiopia have their own limitation as tries to nominate by raising two examples of them. This is what we meant by policy inefficiency.

In benchmarking international experiences over policy drafting, the budget policy, HR development policy, technology selection policy, cooperation policy, K&T spillover policy, K&T adopt and adaptation policy, measurement and reaction policy, and the like must be seen carefully in accordance with the level of attention towards KTT and national development. The actors whom are wanted to involve in the execution and actions to be executed must be clearly manipulated in the policy draft sighting the result as a reference. That is why Ethiopia planes so well but, performs a least in the last transformational periods.

Science, technology and innovation policy must consider the realities on the ground which makes the action to be implementable. The result in the assessment shows that Ethiopian science, technology and innovation policy is mostly looks like a dream which is set without the resource and full enough action planes for the executers.

4.6. Result versus discussion on Critical factors of knowledge and technology transfer and their relation

Based on the results and the discussion, success factors of knowledge & technology transfer are identifies in this study as obvious (economic, political & infrastructural) in which they exits based on the status of the nation and others (organizational, cultural, environmental & human resource) which are reducible by utilizing the available resources.

4.6.1. Obvious factors

Economic factors

It is the first and most infant stage factor in transferring knowledge and technology. Since every knowledge and technology have is own cost, it asks economic capacity of demanders to own as a property. Utilizing it to generate income comes later. The world economic policy have its own impact over the developing countries in that it doesn't promote those developing countries to generate fast income and increase the GDP rate with the balanced cost of investment. Mostly it convinces the majority that this policy makes those developing countries under the hidden line control of developed one in seeking further resources. Because, for the case of technical knowledge it askes nearly 75% of the revenue as a forced share for investing over domestic resources. This is the cost of knowledge and technology unless we can't develop or transfer it.

In case of Ethiopia, the impact of economic factor on knowledge and technology is visible starting from the national innovation policy. Budgeting system on knowledge and technology transfer is still insufficient and it demotions the strategy in science, technology and innovation. Aiming to develop technologically and deriving economy through technology transfer is not achievable in less than 1% national budget from the GDP. In contrast with that of recently developed countries which flows up to 50% of the national budget for technological innovation, Ethiopia is not starting

even to think about technology transfer. Action needs to decide over the required fulfillments to achieve the goal.

In the case of industrial parks, a series critics is raised in different times related to employees. Technology transfer needs comfortable level of working environment and it includes satisfactory handling of employees. Fortune magazine announced a feature of problems associated with economic issue in between employees. IP management and IPDC concerned bodies discussed over the issue to overcome them and to install fertile ground for the employees so that all the workers fill safe and act as per expected.

As per the oral interview conducted with some random employees in the BLIP, adequate level of skill development trainings, capacity building systems and appropriate payment are critical issues in regard to economic factors. All this critics are rolled down from the policy economic problem.

Political factor

It have been identified and recorded as another critical factor in every country economic growth history. Instability of the political system of countries plays a negative role in this filed by demotivating and preventing investors. The special character of this factor is that it is totally linked to the governmental status and performance in which reduction or elimination of such discomforts is suspended on the leading governmental body. Actually there is no hundred percent peaceful states in the world, but countries which dreams to make stable their future doesn't negotiate over the investment and technological development issues. It is believed that economic power can minimize the rate of conflicts whether internally or external. Ethiopia also experiences this feature of difficulty for a long period of time.

Unfortunately all the problems and their solution are being related to the governing body only. It makes difficult the difficulty. In such political environments, the government concerns on sustaining his leading power rather than giving a focus for technological development and economic revolution. In such case, it is better for the government to combine all the efforts eliminating political view differences and other issues then, seat around the table to come up with a legible solution for the common benefit of the country.

Infrastructural factors

In the perspective of this research, infrastructure implies fertile grounds in which knowledge and technology can be absorbed familiarized and utilized for the development of economy. As previous national educational program implies, regular educational institutions like governmental or private colleges and universities are not capable of absorbing new knowledge and technology coming from abroad and even these institutions haven't perform as of expected in R & D which is their normal vision and mission. These weaknesses indicate us for this day special and technology transfer oriented infrastructures have to be established.

These infrastructures may include separated R & D institutions which can convert researches and findings to a practical knowledge and physical technology, spill over organizations that takes away knowledge and technology form investors, and related institutions to support these activities. Spill over organizations may act up to installing the same company as of each foreign investments. It substitutes directly the foreign direct investment and enables the country to perform enough along with the innovation policy. The foreign supply, foreign marketing, managerial skills, quality guides and maintenance techniques can be ape directly via spillover organizations. As per the need of the country to transfer KT, infrastructures can be installed adjusted with the innovation policy.

Now absence of the above infrastructures makes it difficult to transfer knowledge and technology in industrial parks.

4.6.2. Other reducible factors

Educated Human resource

Rather than buying the knowledge and technology directly by costing the resource or row capital, building a technology equipped human capital that can develop internally or adapt and adopt KT from abroad. We have had a good experience in building educated human resource which was practiced years before. Government funded scholarship programs was arranged as per the requirement of the country and all the sponsored students have had the mandate of coming back with the planned level of KT and serve their country in key governmental positions showing remarkable change in the sector.

It is evident that Ethiopia has been introduced with modernization in governmental administration and all other technological events was made through scholars. The key point here is that development of educated human resource needs a series target oriented policy which can be measured at the immediate time of reception. Technology and human resource have a direct relationship and are dependent on each other, meaning that no will be technological human resource unless technology is developed or transferred and technology doesn't exist and can't be owned without technological man power.

In this research perspective, the discussions and survey of status of the organizations regarding knowledge and technology transfer implies as the issue is not given an emphasis as of expected. Prior to scheduling scholar programs, training, and other knowledge and technology based activities; knowing and identifying the required knowledge and technology according to their significance level for the current status of the country and prioritizing them is a better approach in human resource programs. It gives the freedom to u tilize the equipped knowledge and technology in the field which identified before. Otherwise, it may lead us to resource wastage. An investment proclamation states the following goals in defining "export oriented none equity based foreign enterprise collaboration" as: Guaranteed external market access, production know-how of products for export market, export marketing know-how, export business management know-how, strategies for the supply of raw materials and intermediate inputs needed for export products (federal democratic republic of Ethiopian, investment proclamation no. 769/2012, and page: 6572).

All the above mentioned aims are about man power development through FDI. When seen on the paper, it is really interesting for countries like Ethiopia. But, there is not any record of improvements on either governmental or private sectors in the above field of knowledge and technology. This is what we call policy failure in economic revolution. Bulky of trainings have been conducted in each

Environmental factor

So as to transfer the available KT to the available human resource using the available system, it need environmental safety and comfort. When we say environmental factor, we mean that the environment including the safety of physical working area, management system, relation between different bodies in the environment identified for study, payment and incentives, and all other

factors which can influence the process of KTT. In the case of BLIP, turnover rate of employees indicates that most of the employees are not ok to stay there. The reason might be different, but as it was surveyed through face to face interviews, the most dominant rumor is wage and payment rate.

On the other hand, the relation between the upper officials and the rest labor is mostly vertical in that the it doesn't allow and give a freedom to explore the detail of knowledge and technology available in that working environment. Rather, employees are expected to perform the orders from the upper officials/the desire of company owners. All in all, maximum production capacity so as to meet the export market need is a fence in industrial parks working environment. This is tiresome for employees and it doesn't give extra thinking environment about absorbing the available knowledge and technology for future sustainable development and further advancement of the country. Finally, it needs the intervention of the policy through which the role playing governmental organizations assigned for this purpose. The fortune magazine report works also here.

Organizational and/or structural factors

Organization is the ladder to which things put over and acted up and down to arrive to the goal /success. Building the right and efficient form of organization can lead to the right action to address the aim put under the policy proclaimed by the top governmental body. Actually, existence of organizations by their own is not mean enough without effective utilization of the structure. In the case of this research, target group discussions and informal interviews have indicate that there is a gap in coordination between organization which are suspected as responsible of knowledge and technology transfer. There is a broken line between top level policy makers and executives of the policy in the structure of organizations.

As per the discussion held with the investment commission and park management office of bole Lemi industrial park, knowingly or unknowingly, duties and responsibilities of organizational structures who concerns technology transfer are misaligned. Most of the activities around technology transfer were facilitated by industry minister on the behalf of developmental institutions like TIDI, LIDI and MIDI. Now in recent months due to structural change over the STI minister, investment commission is given a role playing function in KTT policy in relation to foreign and domestic investments. Investment commission office installed at the BLIP is not

organized well yet and the works which was under industry minister are not transferred to this office. Apart from conducting the day to day routine activities, this office currently is not working on relaxed knowledge and technology transfer goal of the country.

It is issued already by the current STI minister that industry parks are eyes and sense of organs for the development of economy of the country in accumulating knowledge and technology as a basic resource for further utilization beyond increasing foreign currency capacity. As it have been briefed by the park management, on the existing status, the IP management is performing all activities so as fulfill the export demand set by the investors rather than knowledge and technology transfer policy. It clashes with the policy set by the government official in 5 year transformational strategy. IP management office further indicates that an open and clear means of KTT system is in high demand as it becomes the current critical issue of developmental strategy of the country.

On the other hand Industry Park Development Corporation is one of the concerned organizational structure installed for the purpose of economic growth via industrialization which is expected of means of adopting and adapting knowledge and technology via foreign and domestic investment. There are duties and responsibilities issued for IPDC on the industrial parks development corporation proclamation by the council of ministers. The statement on regulation number 5 of the duties of board of the corporation raises the duty related to assuring the KTT between IPs. Selecting and inviting foreign and domestic investors which can come up with new knowledge and technology for the country is also stated on duties of commission of the corporate on regulation number 4 and 7. The IP proclamation announces about replacing foreign experts by Ethiopian by giving the appropriate skill. Training of IP level employees is placed as optional in the proclamation, (article 28, and sub-article number 4).

A mission about facilitating technology transfer and skill development in general and domestic manufacturing sector is also part of the proclamation. Even if it is not enough and doesn't moderate the organization (IPDC), the corporation is restricted only on land management like asking free land from the government land administration for investment purpose, building of factory shades, renting the shades for investors, following the usage and asking for repairmen of damaged parts of the shades and utilizing the area lend to this purpose. As per the discussion held with the officers

in industrial parks corporate affairs, the main role and purpose of IPDC is managing industrial parks related to the resource utilization.

Chapter five

Development of Conceptual framework to Integrate three determinants of knowledge and technology transfer

5.1. Introduction to frameworks

Conceptual and/ or theoretical frameworks are one of the most important aspects in the research process. In addition to explaining the path of a research and grounds it firmly in theoretical constructs, the overall aim of these frameworks is to make research findings more meaningful, acceptable to the theoretical constructs in the research field and ensures generalizability. Theoretical framework is the specific theory or theories about aspects of human endeavor that can be useful to the study of events. The theoretical framework consists of theoretical principles, constructs, concepts, and tenants of a theory. Frameworks can be used in the whole content of the research paper with every aspect of the research process from the definition of the problem, literature survey, methodology, presentation and discussion of the findings as well as the conclusions that are drawn. Frameworks are believed to help the researchers in visualizing the choices which can come from different direction and maximizes the effectiveness of the research (Grant, 2014).

There are different types of frameworks used by different bodies for different purpose. Among these; theoretical framework, conceptual framework and research framework are the familiar one in most researches. Conceptual frameworks can be used in two ways; conceptual framework templet and conceptual framework in diagram (Botha, 2005).

In this research conceptual framework in diagram are used to show how the three determinants (Methods, actors and actions) of knowledge and technology transfer can be integrated for effective knowledge and technology transfer in industrial parks. These frameworks are capable to indicate the nature, direction of relation, values to share and impact of one element of the framework over the other.

In the first general framework, the three determinants named methods, actors and actions are shown as to be utilized in an integrated way to result in an effective knowledge and technology transfer, encircling the knowledge and technology at the center. The flow is continuous and round

full which indicates that one determinant should move to the next with a full effort by eliminating or reducing the potential factors faced in between the journey, so that the next determinant can be effective in knowledge and technology transfer. Once a barrier stops the movement of each determinant, knowledge and technology transfer can't be achieved at all. The barriers in between the arrows represents the potential factors of knowledge and technology that may be faced by any means and the framework tries to indicate as it must be subtracted (removed or reduced) from the circle of the three determinants.

The detail description of this general conceptual framework is discussed below supported by sub frameworks of each determinates and it tells us what the methods, actors and actions are followed by potential factor answering the how question. In addition smaller frameworks are added as per necessity.

General conceptual framework to integrate determinants of knowledge and technology transfer

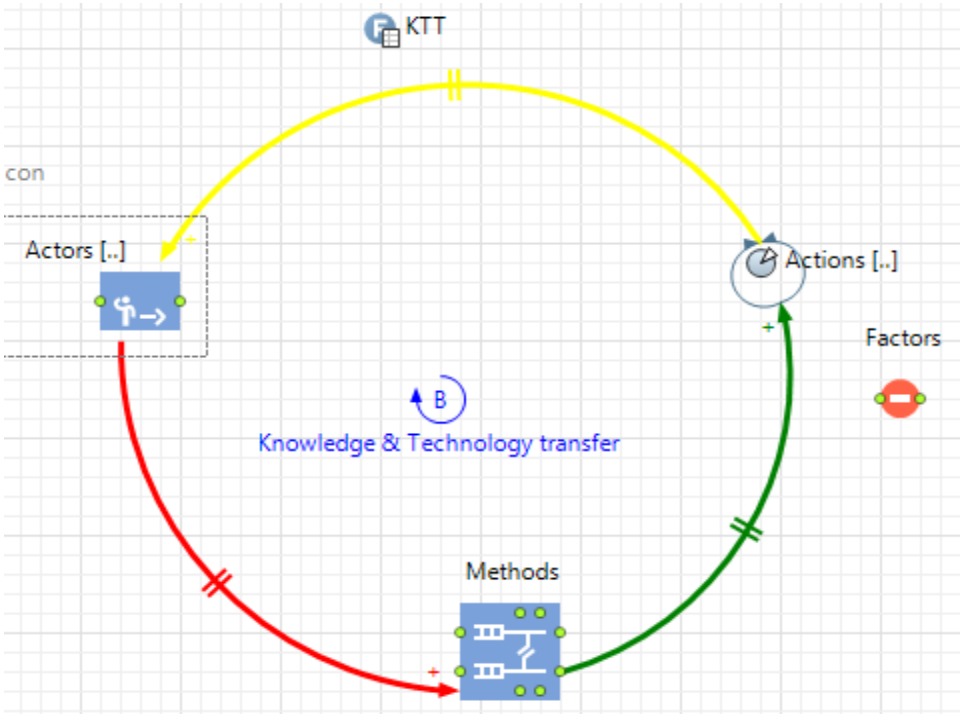

Figure 5. 1 conceptual framework to Integrate Determinants of knowledge and technology transfer

5.2. Knowledge & technology transfer determinants framework detail description

5.2.1. Methods

Under this determinant, possible and most available methods of knowledge and technology transfer are explained. Among these, training, agreement, documentation and spillover organization are discussed here as to be used by the responsible body.

5.2.1.1. Training

- Mode of training:-

Simulators: - is a practical orientation based on learning by doing which helps to test performance of trainees. Software companies and air transport systems are typical K&T areas in which the employees are trained via simulators.

On the job training: - workshops are the typical center of on the job training and mostly are implementable in vocational schools. This mode of training is known for its capacity of transferring the adequate level of K&T to the trainee.

Coaching/mentoring: - a learning and development activities that share similar roots despite lively debate among practitioners over the issue needed to be transferred.

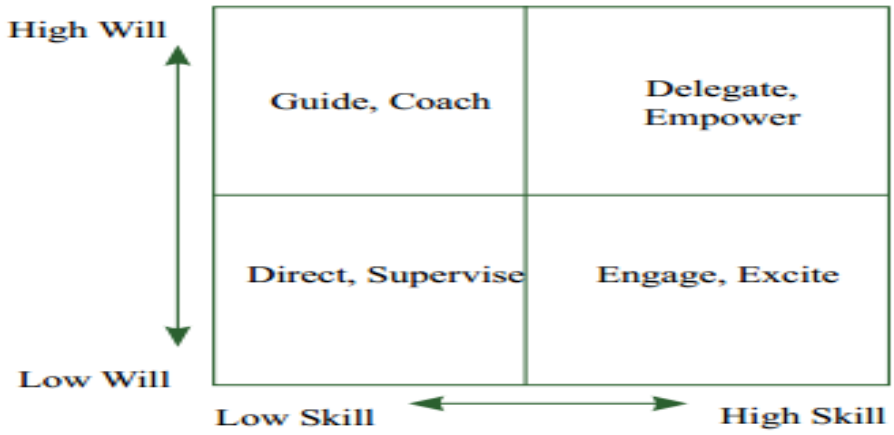

Figure 5. 2 Coaching/Mentoring Cycle: Source (Olivier Serrat-Asian Development Bank)

Lecture: - Cost efficient method of training that allows transfer of K&T to a large target group enabling to present large amounts of information. It lacks detail behavior and practice of K&T.

Educational institutions follow such type of training since then that is why KTT remains stacked in educational institutions yet.

Group discussion and tutorials: - Effective and challenging mode of training which brings unexpected situations requiring flexible reactions of trainees in pooling ideas and experiences from the trainees. It helps to

Role playing: - a mode training in which simple and low cost that focuses on problems which are real and helps to enable the participants to practice constructive methods of confrontation. It can be implemented in areas like management which gives a responsibility to each individual.

Outdoor training: - recruiting local trainees to participate in seminars, scholarship programs, national and international projects related to foreign investments.

Films and videos: - is implementable for operational skills. Self-leering system follows this type of training in which all the actions are done deliberately to upgrade competency level.

Case studies: - it seems like seminar in which abstract information is presented concretely and released to discussion. It is participatory, encouraging interaction between trainees and helps to develop problem-solving skills

Planned reading: - most of the time operation manuals and technological instructions needs series reading prior to implementation.

- Quality of training
  - ~ Trainer capacity to transfer the skill
  - ~ Trainee capacity to equip the skill
  - ~ Training facility: - training centers, financing…
- Time and frequency of training:- training must be reliable for trainee in time and periodic repetition as required.

5.2.1.2. Agreement

- ***Management service***: foreign companies which get in to agreements with the host country about financing, marketing and related managerial skills should put a remarkable KTT as per the agreement signed. The supply chain (backward and forward) system must be

transferred to Ethiopia so that after the termination of agreement with foreign investors, it would be sustained in Ethiopia and the gain from supply of new technological goods for export production and export market share shall continue without the interference of any boundary.

- ***Consultancy service***: - consultancy and support services have their own cost when consultants are always from abroad. In construction and operating industrial parks, Ethiopia should have her own skilled manpower that can run future extensions of the work. The standards, controlling and measuring parameters, improvement techniques around industrial parks are typical skills to be transferred and sustained in to Ethiopia.
- ***Technical know-how***:- technical skills related to main operation, maintenance and quality are needed to transfer so that Ethiopia would bale to install similar export standard companies and to replace foreign investment by domestic which can benefit the country in al dimensions, self-control stage.
- ***Trademark license***: - technological license is the main roadmap in KTT. It may be given through import and export trade, production and other means of technological development actions. Ethiopia should benefit from foreign investment in knowing how to get trade license in different areas of technological innovation mostly which are under the goal of the policy. Ethiopian have had different domestic natural and human made (processed) goods to be licensed, but are not managed and utilized in the international market yet.
- ***Franchise:***- the foreign investment should changes to franchise system in which once Ethiopia is going to be the owner of the technology, investors would invited only to use that technology for their own benefit paying for the brand to Ethiopia. This would be implementable when domestic investors are not able to pay the brand fee to use the technology.
- ***Software license***: - is the key technological innovation stage in which the country comes owner of technology that can control many systems in the world and can be controlled by the owner for the sake of capital transformation. It is very crucial and important if the licensed software have international impact.

- ***Research and development***: - financing of R&D, participants in R&D and other related issues should be benchmarked from foreign investment, especially form countries whom are effective in the area.

5.2.1.3. Documentations

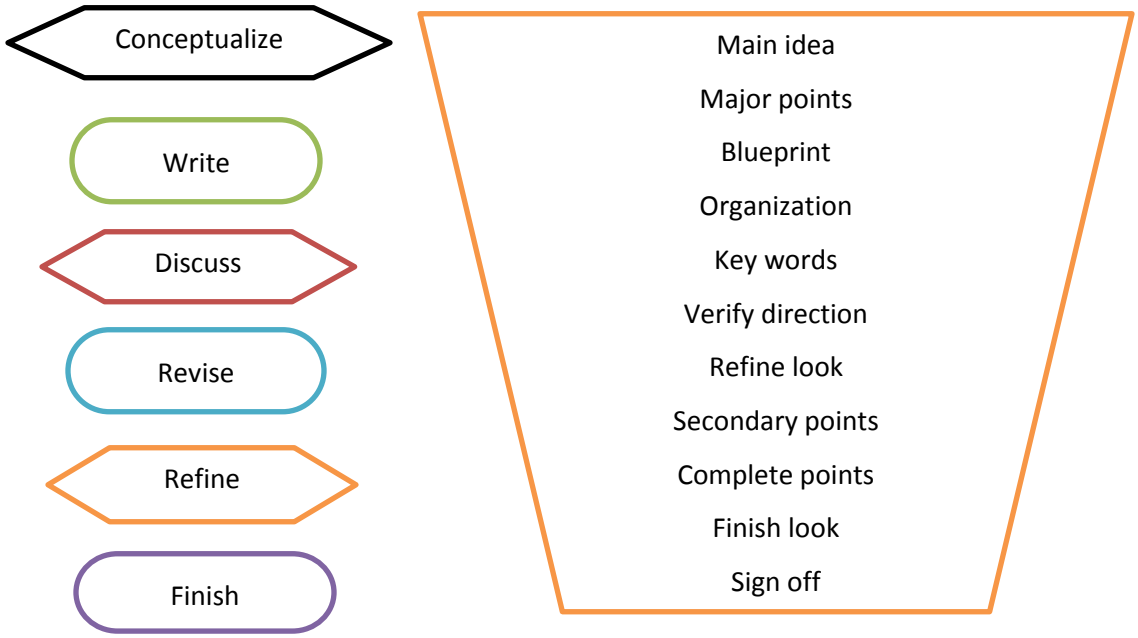

Figure 5. 3 Documentation Process

- ***Operation manuals***: - sometimes maintenance of machines which came from abroad on the behalf of investors happened to locked and our choice in such occurrence is going to transporting the machine again to the source for maintenance purpose, because we didn't have a document manual for maintenance. So documentation prevents such crises in the technological activity.
- ***System documentation***: - internal and external
- ***User documentation***: - exists when each individual (as organization and personal) records and documents every sequence of the activities in the technological environment which is required to be transferred. It helps to reactivate the system whenever the investment is fire out or phase-out.

5.2.1.4. Spillover organization

- ***Moving skilled labors away***: - for the purpose of utilizing them in governmental or private domestic company to create competitive production and management technology. Governmental or private can act as spilling organizations.
- ***Split joint venture companies***: - one opportunity from joint venture investment is that domestic companies which are in joint investment can be split away knowingly or unknowingly, on the behalf of the government or on the will of the investor. That is why china owns many investment in abroad. Beginning as a share company and inclosing the company at all is the amazing system of china till this day in their technological innovation and economic development program. So, Ethiopia should learn from such investment activities and go forward to do so.
- ***Benchmarking between foreign and local companies***: - forced or voluntary participation in technological benchmarking activity. It may be governmental driven action for the benefit of the country.
- ***Spin out the company***: - installing and duplicating the same company as to substitution of foreign investment.

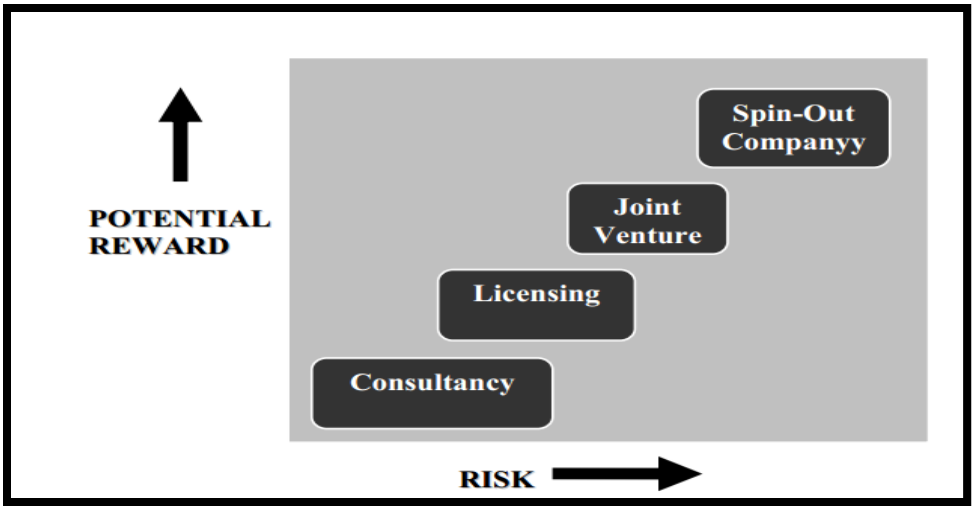

Figure 5. 4 Procedure to Spin Out the Company: Source (European Commission Experts Report)

5.2.2. Actors & their role

These are responsible and participatory bodies in knowledge and technology transfer process which are gives tasks as to perform in an effective way. These actors can be governmental or private sectors. In the conceptual framework of actors, there are two loops; policy area and execution area. The first loop in the actors' sub-conceptual framework named as "policy area" refers to the actors' integration in developing knowledge and technology transfer policy. In this area, the government by council of science and technology, industry minister and science, technology & innovation minister are involved. Whereas in the second loop, execution area, investment commission, governmental universities, developmental institutes, IPDC, industrial parks, foreign investors and private sectors are involved. In the center of this loop, incubation center is placed on which all the actors of KTT should meet to insure the target.

Between the first and second loop, there is an intersection area named as "measurement area" where the top and lower level of knowledge and technology transfer actors check each other along with the works done.

5.2.2.1. Government: -

As of the most countries, government is the top responsible body and actor of knowledge and technology transfer and economic development activity. Government can shape the way to go in KTT program by coordinating all the available resources in hand. The upper level body shall check the right execution of the policy and receive the feedback whereas the lower level body can measure the responsibility and accountability of the upper one regarding knowledge and technology transfer.

5.2.2.2. Council of science and technology

In case of Ethiopia, government participates in knowledge and technology transfer action in the representative of council of science and technology as shown in the framework. This representative body directly contacts the industry minister, science, technology and innovation minister and the universities as per the duties given from the government on knowledge and technology transfer.

5.2.2.3. Industry minister: -

- Policy makers: - should review all the available information and updated system of KTT in the world and integrate the resources in the country when drafting the KTT policy. The result expected from the policy is dependent on the traceability of the policy in implementation.
- Auditors: - those actors are expected to design real follow-up and measurement system that targets the result of the KTT process.

5.2.2.4. Science, technology & innovation minister: -

A new and modified actor in the government on KTT which is given with more specific objective than industry minster. This actor of KTT have administer the following sub-actors directly or indirectly in collaboration with education minister. This part of actors are concentrated on developing K&T internally.

- ***Universities***

  . Researchers: concepts and sciences are explained and formulated here.
- ***Developmental institutes***

  . R & D department: - experimental work of K&T conducted and is being ready for duplication.
- ***Incubation centers***

  . Knowledge and technology marketers: - marketing and/commercialization of K&T in domestic or international market is the final goal of this actors.

5.2.2.5. Investment commission: -

More specific tasks given to this actor of the governmental KTT strategy and is near to technologies related to foreign investment. The agreements and identification of K&T related to foreign investment are works left to this actor of the government sector. The following sub actors are treated as another destination of actions in KTT in lower level and manageable size.

- ***Project approval and implementation offices***: - have direct relation with the K&T practiced via foreign investments. It is simple to address KTT issues through this actors linked to upper responsible bodies.

- ***Industry Park Development Corporation***: - tasks related to KTT given to this actor via proclamations of technology and innovation from the government. IPDC should serve as a hand to the government in passing the available K&T in the foreign investment area and make them ready to be owned by the country. There is a lower actor IP under this category in which the smaller activity is being accomplished through.
- ***Foreign Investors***: - controlled actors which are already in the process of KTT by signing agreements.

5.2.2.6. Private sectors

This includes Local investors, Consultancy agencies, and private educational institutions which can serve as an actor to spin out the foreign companies accordingly. As can be seen in the conceptual framework of actors, private sector is in contact with investment commission, governmental universities and developmental institutes as per the need and requirement of actions around KTT. The government should invest in this area to build the capacity of companies in adopt and adapting the coming new K&T related to investments in industrial parks.

The summary of all the description above is presented below on the sub conceptual framework of actors. It is collection of best characters and better way of links based on the literature survey and the real environment in Ethiopia observed in the study.

Sub-conceptual framework of actors

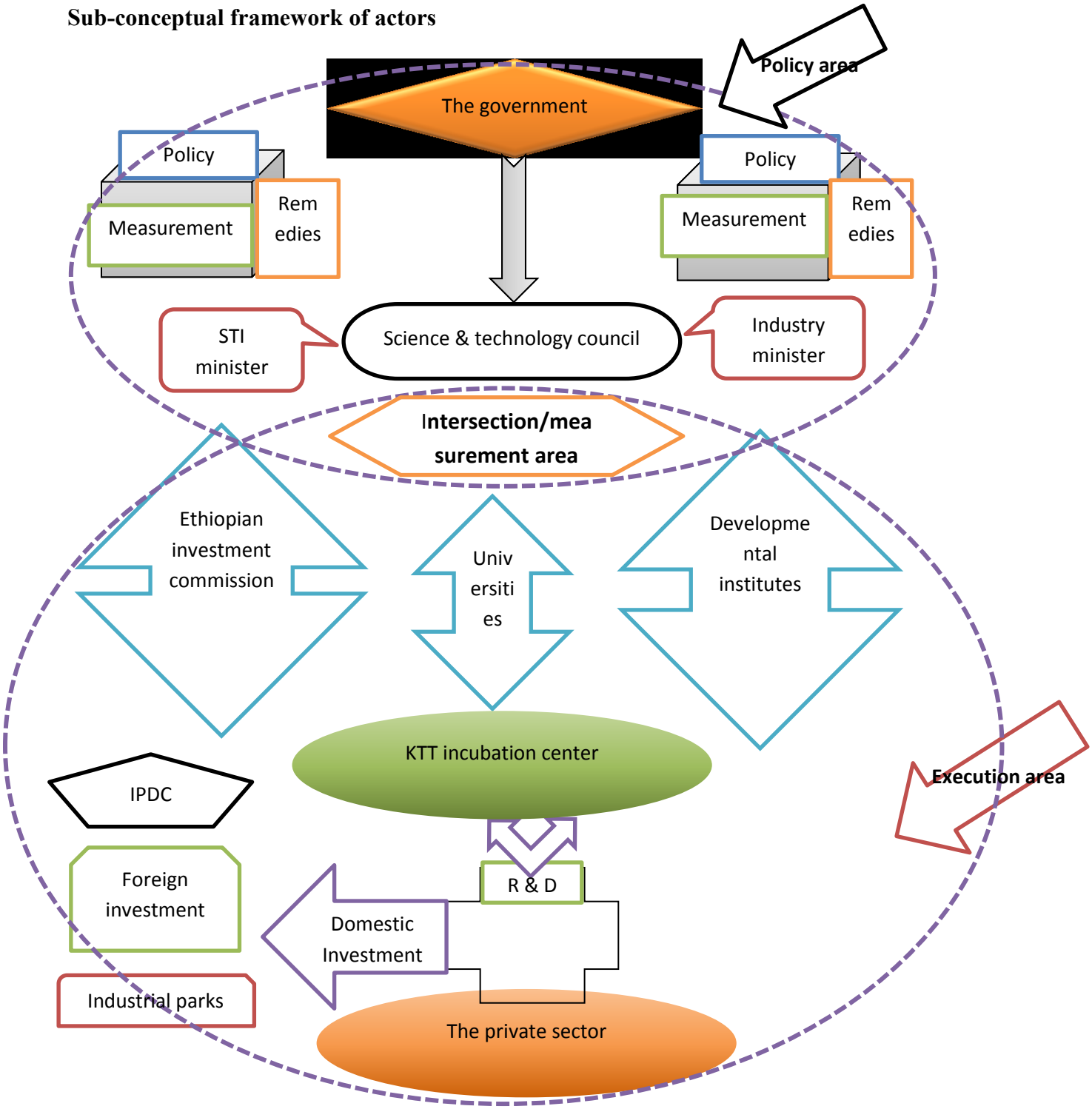

Figure 5. 5. Sub-conceptual framework of actors: source (the writer)

5.2.3. Actions

Actions are activity planes around knowledge and technology transfer. Total sum of actions can be categorized as policy preparation, follow up and measurement methods, measurement parameters, remedy activity and decisions. The conceptual framework of actions has mainly four section. Policy preparation, implementation, measurement and remedy (corrective action) while the inputs can be gathered during the policy preparation and measurement time to plan better on knowledge and technology transfer.

5.2.2.1. Policy:- policy is recommended to be

- ✓ Customer oriented
- ✓ Target full and understandable
- ✓ Implementable in available budget and scope
- ✓ Time bounded and categorized
- ✓ Addressable and subjective
- ✓ Belongingness and auditable
- ✓ Broken-down to the least and simple activity

5.2.2.1.1. Follow up and measurement method

- ***Follow up method***

➢ Top to down and bottom up follow up system

. Sending the message and receiving the response

➢ Forced and self-responsible

. Give and take rule: - if we give our resource, we should take a remarkable value form the investors that is KTT.

➢ Install both vertical versus horizontal communication channel which can prevent the misunderstandings and fussy structural flow in identifying the gaps and preparing the solution.

- ***Measurement method***: - anything without measurement is said to be planned for loose. Resource wastages and capacity degradation are results of planes which are set in the absence of measurement system for the performance of the plan in the action phase.

5.2.2.1.2. Parameters

. To measure the goals: - timely, implementable, significant…

. To measure the actions: - fits, priority, time and cost,

. To measure the process: - healthy, as scheduled,

. To measure the result: - marketable, sustainability,

5.2.2.1.3. Remedies

- Over the methods: - which have been used in the KTT process. If it was not effective, it is time to change the other best method of KTT and react again.
- Over the policy: - let's rearrange and rephrase the KTT policy as per the feedbacks received through the vertical and horizontal communication channel. New needs and requirements of the country must also incorporated here to address most technological issues.
- Over the actors: - include other necessary actors, remove unwanted actors which elongates the path of KTT, reformulate the position of actors in the KTT.
- Over the actions: - redefine, restructure, relocate actions when formulating the policy and distributing the tasks to the actors.
- Over the process: - take an assessment over the process of KTT in all aspects (along the determinants of KTT). Keep the records of the gaps and analyze them for better improvement.

5.2.2.1.4. Decisions: - take a decision over the feedbacks and the gaps observed through all the measurement process.

5.2.2.1.5. Incentives/competing mechanism

- For actors who performs best in the process (result oriented)
- For special contributions in any circumstance over the goal (individuals or organization)
- For those who markets the transferred knowledge and technology

Summary of descriptions regarding the actions of knowledge and technology transfer is shown in the conceptual framework of actions below.

Sub-conceptual framework of action

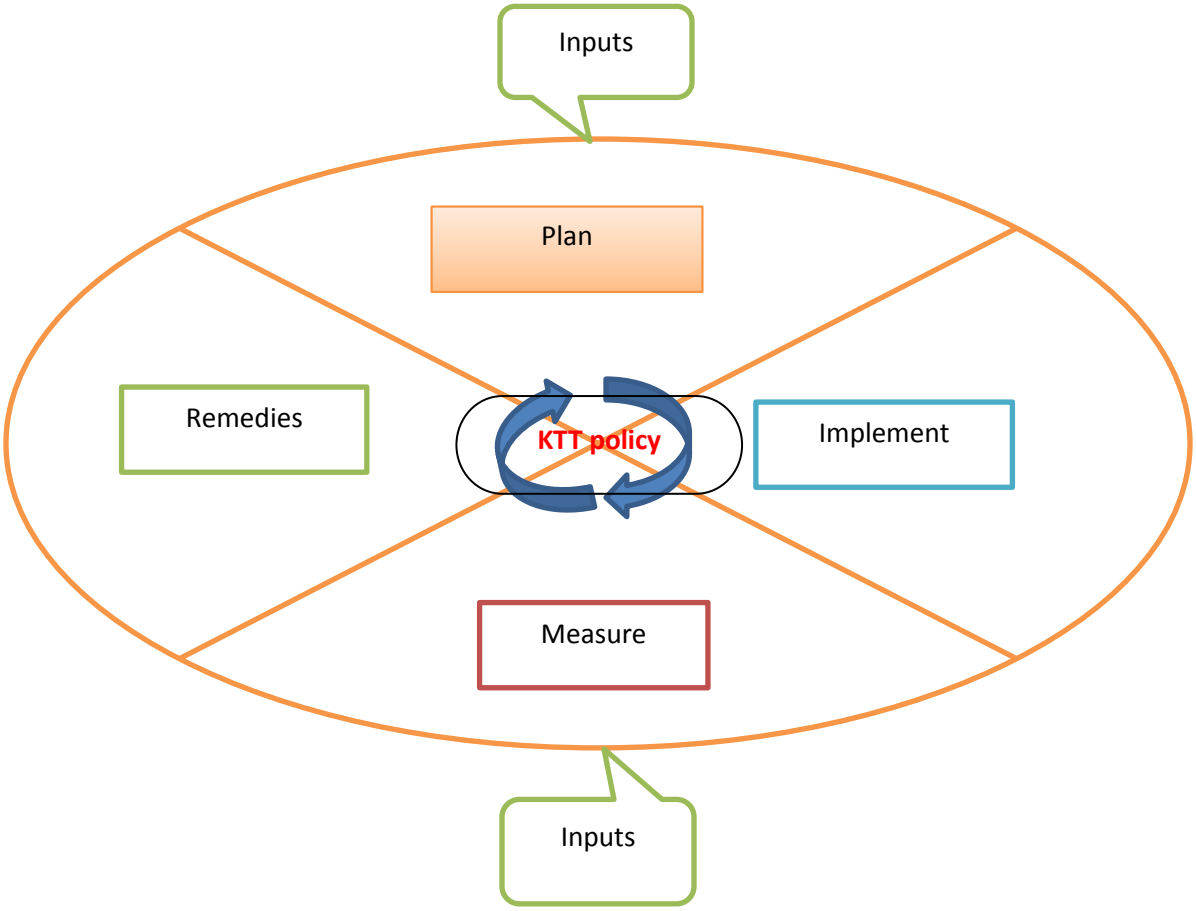

Figure 5. 6. Sub-conceptual framework of actions

Chapter six

Study conclusion and Recommendation

6.1. Conclusion

In Ethiopia, knowledge and technology transfer is taken to be the playing pole of the economic development. The 5 year transformation plan is the result of this general decisions by the government to reform the economy via increasing GDP of the country so as to improve the life style of peoples. Foreign investment in the industry sector is a recent history in Ethiopia followed by ADLI. Government has formulated revised policies periodically and installs organizations and rearranges structures of the system. Industrial parks are part of technological innovation and economic development progress as an actors of KTT in the system. Bole Lemi Industry Park is treated as one center of knowledge & technology transfer. Status, mechanisms of transfer, evaluation and policy formulation of K&T is investigated differently in different time by the government and individuals.

However, knowledge & technology transfer in remains an issue to be researched for additional needs. This thesis work entitled as "status and prospects of knowledge & technology transfer in Bole Lemi Industry Park" looks in to Bole Lemi Industry Park as the park has facing problems in the field. Replacement of foreign expertise with local manpower in three year is not achieved yet because the expected level of knowledge & technology transfer is not addressed. Due to this expats request for contact renewal for additional three year. There is high Labor movement across the park, but is not utilized as a means of the transfer by the government. By conducting appropriate survey & review of literatures, study gap was identified as "integration of the methods, actors & actions of knowledge & technology transfer remain untouched".

Objective of this study was to investigate the existing status and developing a conceptual framework to knowledge & technology transfer for Bole Lemi Industry Park by setting specific objectives to accomplish the goal of the research. To achieve this objective, research questions were raised which helps in designing appropriate methodology and all the needed data were collected using questionnaire, structured & semi structured interview. Focus group discussion conducted to cover the untouched areas of the issue. Tabular, graphic & descriptive methods of

result presentation & discussion were used to explain the status of knowledge & technology transfer in the park by comparing the result with the plan and best practice of other nations.

Absence of most of knowledge & technology transfer methods and inefficient implementation of the existing one, lower level capacity utilization of actors of KTT in relative to the expected and designed one, misunderstanding between actors structure in accomplishing actions along with knowledge and technology transfer and wrong placement of actions when distributing tasks to the actors were the main results of investigation. In doing so, three determinants of knowledge & technology transfer were identified as critical in the process as methods, actors & actions.

To fill the gaps discussed, a conceptual framework to integrate the three determinants of knowledge and technology transfer is developed. Sub conceptual frameworks for actors & actions is developed and discussed along with the role of actors & action plans.

Finally, effective use of these three determinants of knowledge & technology transfer can give a better outcome of knowledge and technology transfer in Bole Lemi industrial park.

6.2. Recommendation

This research as a starter, tries to deal with the preliminary problem which is thought to suffer Ethiopia from transferring knowledge and technology via industrial parks. But, this work by itself is not to mean full enough to answer all the problems discussed and it may not be able to solve these to the last. Another researcher can further investigate the problem and may forward his own solution still. Based on the result found from the existing status of industrial parks and the related responsible bodies, the discussion held following the result and the findings of the research, here are some recommendations which are expected to be better if implemented. Beyond the finding of this research, the gaps raised in the discussion are also expected to be filled by the governmental and private responsible bodies as indicated below.

- By first and most, the Ethiopian government shall adjust the national technology and innovation policy as per the direction of current technology transfer trend. Once the door is opened for foreign investment, the primary goal must go to knowledge and technology transfer and following foreign currency and job opportunity. Since then, a policy that can enforce this goal directly should be developed. This is not a choice, rather is a mandate for developing Ethiopia. So, the policy makers on technology transfer in industrial parks should refer the most effective policies of recently developed countries and benchmark the best one by relating to Ethiopia.
- Following the policy, the executers need to be arranged in an open, clear and accountable way, so that works along knowledge and technology transfer in industrial parks will be give and received in number. Here the Ethiopian investment commission and the industry park development corporation shall take the majority of works knowledge and technology transfer in industrial parks. These two actors should be linked directly and it is better to make them accountable to science, technology and innovation minister.
- The evaluation parameters and measurement frames for knowledge and technology transfer activities in industrial parks needs to be installed as a part of policy of technology transfer. In this regard, the type and number of technologies required to transfer shall be counted and given to the executer with a time frame to make it easy for measurement.

- Investment commission in coordination with industry minister can built a spillover organization that works on copying foreign companies deliberately for the purpose of substitution. Since most of the foreign investments are in contract, the overall nature and process of the companies should sustain in Ethiopia, in case they terminate. Spinning out the companies can be done by governmental or private sectors for the benefit of the country through the movement of employees.
- Again the Ethiopian government via responsible organization, shall identify the type of knowledge and technology to be transferred, the method to be used to transfer the selected knowledge and technology, the appropriate actors to be assigned and actions to be performed so as to accomplish the objective and insure the policy towards technology transfer. These sequential and inter-related activities should be followed seriously to achieve the goal.
- Practical knowledge and technology based man power would be made to involve in industrial parks deliberately loading the aim to transfer specific knowledge and technology from industrial parks. Researchers, Higher level education professionals and TVET graduates are most fitted group of societies to perform such result oriented works.
- Programed coaching and benchmarking systems between foreign and local investors so as to upgrade the capacity of domestic companies and to increase their international influence in marketing and other fields of trade.
- Share investment (joint venture) is promoted for being future ownership of knowledge and technology. The government shall support private sector to engage in such activities and can push to enclose the companies which was under the share for the benefit of the country.

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Appendices

Annex I- questionnaire and interview guidelines

Interview guideline

The purpose of this study is to assess the status of knowledge and technology transfer and find out the way of technology transfer to local employees from client (foreign experts), to boom out it to the country as it is one objective of foreign investment. All the information provided will be kept confidential and will not be shared with any third party. The information collected from your company will be strictly used for the sole purpose of partial fulfillment of MSc degree. Your support and cooperation will be too much appreciated. I will ask you a number of questions, which will take around 5 to 10 minutes of your time and that is to address issues which are not covered by questionnaire. Thank you very much for your co-operation.

Introductory questions

Name and position, date of interviewee

- The company`s general description: (company name, agent country, products, No of employees, working years, …)
- What is the major pleasure to invest in Ethiopia? (vision and mission of the company)
- Can you tell me core mutual agreements between your company and the host government?

Knowledge and Technology transfer related questions.

- What type of knowledge and technology are used and utilized in your company?
- What are the major activities conducted by your organization to upgrade employees capacity?
- Would you mention employee's performance measurement systems?
- Is there any gap between the required and the actual performance of employees?
- In your opinion, what was the reason for this gap at the back?
- What methods and channels have been utilized to transfer the required knowledge and technology to your employees and through the country?

- Which one has been found as effective when measured from employee's performance angle?
- How your employees communicate in the direction of knowledge and technology sharing?
- How information flows up and down? Open, closed, upward only, downward only, two-way, …
- Who are the responsible bodies in knowledge and technology transfer activities?
- Do you believe that, the required knowledge and technology is being transferred well to your employees?
- Do you think that, the transferred knowledge and technology is well understood by the employees?
- Have you ever seen barriers/problems in transferring knowledge and technology?
- Are the employees welling to absorb knowledge and technology available in your company?

Questionnaire sheet (for Bole Lemi Industry park selected companies)

I. Introduction phase/background questions

1). Respondents' profile

1.1. Company name and main business:

1.1. Position in this company:

1.2. Working years in the company:

1.3. Academic level:

2). what do we mean by knowledge and technology?

3). How would you define knowledge and technology transfer in your understanding?

4). what are the main goals and objectives of your company?

- ✓ High market share
- ✓ Human resource development
- ✓ Knowledge and technology transfer
- ✓ Country mutual relation
- ✓ Social settlement
- ✓ others

5). what type of knowledge and technology is/are available here in your company? Please try to list down under the category given.

Tacit:
Explicit

6). How do you rate the contribution of your company performance in knowledge and technology transfer?

A). very low B). Low C). Good D). Very good E)/ excellent

7). as a home country, what type of agreement do have your company with the home country, Ethiopia?

II. Knowledge and technology transfer methods/channels based questions

8). Do your company have knowledge and technology transfer centers?

Yes ☐ No ☐

9). If yes for the above question, how it is organized?

9.1. Management level
9.2. Technical level
9.3. Separated
9.4. Industry park level
9.5. Other form …..

10). of the most common strategies of knowledge and technology transfer, which one is more implemented in your company? Please rate them in percent.

10.1. After Action Reviews:
10.2. Best Practices:
10.3. Co-op/Internships:
10.4. Communities of Practice:
10.5. Documenting Processes:
10.6. Document Repositories:
10.7. Expert Interviews:
10.8. Job Aids:
10.9. Knowledge Audits:
10.10. Knowledge Fairs:
10.11. Knowledge Maps and Inventories:
10.12. Learning Games:
10.13. Mentoring:
10.14. On-the-Job Training:
10.15. Storytelling:
10.16. Training

11). Try to rate the following questions as per your knowledge.

	Very simple	Simple	Moderate	complex	Very complex
Level of knowledge and technology complexity					
Level of knowledge and technology complexity to transfer					
Level of knowledge and technology transferring methods					

12). for the following most common agreement types, try to indicate the type and level of impacts on knowledge and technology transfer procedures?

Type of agreement	Impact (+ve)	Impact (-ve)	Very high	high	low	Not at all
✓ Access to new market						
✓ To lower the production cost						
✓ Access natural resources/inputs						
✓ To join a specific partner						
✓ Export back to home country						
✓ To benefit from trade agreement						
✓ To build a base for business in host country						
✓ Diversify the existing product portfolio						
✓ Other, please specify						

13). Is there any restriction regarding the type of knowledge and technology to be transferred in your company context? If yes, please try to indicate the reason.

Type of knowledge and technology	Reason for not to be transferred

14. Try to rate the following parameters as given.

	No or little extent	Some extent	Moderate extent	Great extent	Very great extent
Quantity of training					
Quality of training					
Involvement of labors in training					
Park management and IPDC office contribution in training					

Quantity of mode of knowledge and technology transfer					
Learning capacity of employees					
Willingness of companies to prepare training					
Time frame of trainings					
Repeatability of trainings					

III. Knowledge and technology transfer Actors/participants based questions

15). Please try to categorize your employees as seen below. (In number)

15.1. Engineers:- masters: ------- ; degree: ------- ; diploma: ------ TVET: ------

15.2. Technicians: - masters: -------; degree: -------; diploma: ------ TVET: ------

15.3. Marketers: - masters: -------; degree: -------; diploma: ------ TVET: ------

15.4. Management:- masters: -------; degree: -------; diploma: ------ TVET: ------

15.5. Others ---------

16). How many of those employees are in key positions which can influence knowledge and technology transfer activities? (Identify as "foreigners" and "locals") … (In number)

Engineers: ---------- marketers: --------

Technicians: ---------- managers: --------

Others ----------

17). Level of computer literacy of your employees in number as:

Not literate, Medium,

Beginner/basics, Advanced,

18). what qualification do have the persons in your organization whom dedicated to KTT activities:-

18.1. Science / engineering graduates
18.2. Law / business economic graduates
18.3. Other graduates
18.4. Administrative qualification
18.5. Technical qualification
18.6. Other qualification

19). specifically, what knowledge and technology your employees are needed to conduct their day to day routine job efficiently and effectively.

20). of the total employees in your company, how many are made to involve in knowledge and technology transfer activities?

Trainer: ---------
Technicians: --------
Trainee: ----------
Normal labors: ------
Professionals: -------

21). Up on the above answer in question 8, how many of the employees are found to be capable of absorbing the transferred knowledge and technology?

Trainer: ---------
Technicians: --------
Trainee: ----------
Normal labors: ------
Professionals: -------

22). what is invested to develop technically capable human resource in transferring knowledge and technology?

Company level
IPDC level
Industry Park level
Extra

IV. Knowledge and technology transfer actions based questions

25). what are major and repetitive supportive actions made in your company to transfer knowledge and technology?

---

26). of the following factors of effective knowledge and technology transfer, which is/are the critical in your company?

26.1. Managerial limitation
26.2. Employee initiative
26.3. Insufficient training
26.4. Insufficient trainer
26.5. Absence of training centers and equipment's
26.6. Ineffective way of delivery in transferring Knowledge and technology.

27). If you think that the right type of knowledge and technology is transferred, what value is added to your company?

- ✓ Employee development
- ✓ Increment in production quality
- ✓ Increment in production quantity
- ✓ decrease in total cost of the company
- ✓ increment in foreign currency
- ✓ increment in total cost of the company

28). If you don't believe that the required knowledge and technology is not transferred well, what will be the gap? Please try to mention all possible cases.

29). Have you ever measure the results of knowledge and technology transfer processes conducted in your company?

☐ Yes ☐ No

30). if question number (30) is being practiced in your company, what are the measuring methods? ----------

31). In your opinion, what is to be performed so as to insure knowledge and technology transfer issue?

Company level: IPDC level:
Industry park level: Other:

32). Try to fill the following table as per your performance.

Year	Type of training	Target group	Reputation /month; year	Planned	Achieved	Gaps before training	gains	comments

33). Scale up the following regarding training effectiveness.

	Very sensitive	Sensitive	moderate	low	Not sensitive
Training Time					
Training Budget					
Employees motive					
Training equipment's					

34). If employees motive is found to be sensitive in training effectiveness; what will be the reason at the back?

35). what is your expectation in knowledge and technology transfer?

- Methods
- Actors
- Actions

Questionnaire sheet (For factory labors like R & D officers, trainers, technicians, shop managers, quality persons, production heads.)

1). Respondents profile:

Sex: ---------- age: ----------

Educational qualification and level: TVET ---: Diploma: ---: Degree ---: MSc: ---

Position/task/duty: ----------

Experience in this company: ----------

2). what is knowledge and technology in your understanding?

3) What do you mean by knowledge and technology transfer under your perspective definition?

4). what knowledge and technology are you utilizing here in your job?

5). what type of knowledge and technology is/are available here in your company? Please try to list down under the category given.

Tacit:

Explicit

6). what is your role here regarding knowledge and technology transfer?

7). Do you believe that you are technically capable in your job with respective to the required knowledge and technology? Yes ☐ No ☐

II. Knowledge and technology transfer methods/channels based questions

8). Do your company have knowledge and technology transfer centers?

Yes ☐ No ☐

9). If yes for the above question, how it is organized?

9.1. Management level

9.2. Technical level

9.3. Separated

9.4. Industry park level

9.5. Other form …..

10). of the most common strategies of knowledge and technology transfer, which one is more implemented in your company? Please rate them in percent.

10.1. After Action Reviews:
10.2. Best Practices:
10.3. Co-op/Internships:
10.4. Communities of Practice:
10.5. Documenting Processes:
10.6. Document Repositories:
10.7. Expert Interviews:
10.8. Job Aids:
10.9. Knowledge Audits:
10.10. Knowledge Fairs:
10.11. Knowledge Maps and Inventories:
10.12. Learning Games:
10.13. Mentoring:
10.14. On-the-Job Training:
10.15. Storytelling:
10.16. Training

11). Try to rate the following questions as per your knowledge.

	Very simple	Simple	Moderate	Complex	Very complex
Level of knowledge and technology complexity					
Level of knowledge and technology complexity to transfer					
Level of knowledge and technology transferring methods					

12). for the following most common agreement types, try to indicate the type and level of impacts on knowledge and technology transfer procedures? (Only for R & D officers).

Type of agreement	Impact (+)	Impact (-)	Very high	high	low	Not at all
✓ Access to new market						
✓ To lower the production cost						
✓ Access natural resources/inputs						
✓ To join a specific partner						
✓ Export back to home country						
✓ To benefit from trade agreement						
✓ To build a base for business in host country						
✓ Diversify the existing product portfolio						
✓ Other, please specify						

13. Try to rate the following parameters as given.

	No or little extent	Some extent	Moderate extent	Great extent	Very great extent
Quantity of training					
Quality of training					
Involvement of labors in training					
Park management and IPDC office contribution in training					
Quantity of mode of knowledge and technology transfer					
Learning capacity of employees					
Willingness of companies to prepare training					
Time frame of trainings					
Repeatability of trainings					

III. Knowledge and technology transfer Actors/participants based questions

14). what seems like your personal capacity improvement after trainings

	excellent	Very good	good	Not satisfactory	Not at all
Inter Personnel communication					
Competency level					
Production quality					
Doing new on the job					
Money making capacity					
Extra Qualification and Job title					

15). what activities are commonly practiced in your organization to transfer knowledge and technology?

16). Please try to rate the following points according to the actual practice of your organization.

	Very high	Moderate high	Medium	low	Absent
Ability to identify knowledge and technology gaps					
Accessibility of training centers					
Accessibility of trainers					
Accessibility of knowledge and technology transfer mechanisms					
Capability of trainers to transfer knowledge and technology.					
Capability of trainees to absorb knowledge and technology					
Availability of national policies for knowledge and technology transfer					
Capability of national policies to enforce knowledge and technology					

Willingness of foreign home companies to transfer their knowledge and technology to the host countries					
Time frame of trainings					
Repeatability of trainings					

17). what motives have been made to foreign investors (specifically in industrial parks) so as to transfer their knowledge and technology on their interest?

18). How much are related the actions taken to transfer knowledge and technology with that of national policy?

Highly related ☐ moderately related ☐ weak relation ☐ not related ☐

19). specifically, what knowledge and technology you need to conduct your day to day routine job efficiently and effectively?

20). of the total employees in your company, how many are made to involve in knowledge and technology transfer activities?

Trainer: --------- Technicians: --------

Trainee: ---------- Normal labors: ------

Professionals: -------

21). Up on the above answer in question 8, how many of the employees are found to be capable of absorbing the transferred knowledge and technology?

Trainer: --------- Technicians: --------

Trainee: ---------- Normal labors: ------

Professionals: -------

22). what is your expectation as if to be performed to develop technically capable human resource in transferring knowledge and technology?

Company level IPDC level

Industry Park level Extra

IV. Knowledge and technology transfer actions based questions

25). what are major and repetitive supportive actions made in your company to transfer knowledge and technology?

26). of the following factors of effective knowledge and technology transfer, which is/are the critical in your company?

26.1. Managerial limitation
26.2. Employee initiative
26.3. Insufficient training
26.4. Insufficient trainer
26.5. Absence of training centers and equipment's
26.6. Ineffective way of delivery in transferring Knowledge and technology.

27). If you think that the right type of knowledge and technology is transferred, what value is added to your company?

- ✓ Employee development
- ✓ Increment in production quality
- ✓ Increment in production quantity
- ✓ decrease in total cost of the company
- ✓ increment in foreign currency
- ✓ increment in total cost of the company

28). If you don't believe that the required knowledge and technology is not transferred well, what will be the gap? Please try to mention all possible cases.

29). Have you ever measure the results of knowledge and technology transfer processes conducted in your company?

☐ Yes ☐ No

30). if question number (30) is being practiced in your company, what are the measuring methods? ----------

31). in your opinion, what is to be performed so as to insure knowledge and technology transfer issue?

Company level: IPDC level:

Industry park level: Other:

32). Try to fill the following table as per your performance.

Year	Type of training	Target group	Reputation /month; year	Planned	Achieved	Gaps before training	gains	comments

33). Scale up the following regarding training effectiveness.

	Very sensitive	Sensitive	moderate	low	Not sensitive
Training Time					
Training Budget					
Employees motive					
Training equipment's					

34). If employees motive is found to be sensitive in training effectiveness; what will be the reason at the back?

35). what is your expectation in knowledge and technology transfer?

- Methods
- Actors
- Actions

Questionnaire sheet (For IPDC, science & technology minister, industry minister).

I). Introduction phase

Name of organization

Respondent's sex: …. Age: … Experience:

Position: Academic level:

Profession:

1). what is knowledge and technology in your context?

2). How would you define knowledge and technology transfer in your understanding?

A). Human resource and capital based questions

3). Can you rate the level of sufficient human resources and professionals with knowledge and technology management skills in your organization and in the country in general?

Very high ☐ High ☐ moderate ☐ not sufficient ☐ absent ☐

4). adequate human resource collaboration for efficient technology transfer in your organization, especially around industrial parks and in the country in general?

Very high ☐ High ☐ moderate ☐ not sufficient ☐ absent ☐

5). sufficient sources of public and private funds that could enable an effective technology transfer system in your organization and in the country in general?

Very high ☐ High ☐ moderate ☐ not sufficient ☐ absent ☐

- If, necessary, please rate it in percent from the GDP point of view.

6). How would you state the load given for knowledge and technology transfer in your organization? ----------. Is it stated at the front page as the major role of your organization?

7). Is knowledge and technology transfer part of the national economic strategy in your organization?

Yes ☐ No ☐

8). In what form and amount does the knowledge and technology transfer offices are organized in our country?

At the Country level
At industry minister level
At science and technology minister
At industry park management level
At individual industry level
Other form

9). Do you believe that the HRM structures in industrial parks are capable to spill-over knowledge and technology from the foreign companies?

Yes ☐ No ☐

B). Knowledge and technology transfer methods and techniques based questions

10). Scale up the following as per your knowhow.

	Very sensitive	Sensitive	moderate	low	Not sensitive
Training Time					
Training Budget					
Employees motive					
Training equipment's					
Trainer access					
Trainer capacity					

11). which modes of knowledge and technology transfer are addressed and promoted by your activities, and to what extent (frequency).

R & D collaboration / contract research projects, scientific/tech. services	Frequency
Commercialization of R & D results by patenting, licensing	
Entrepreneurship: spin-outs from university, start-ups (eg. via incubator, entrepreneurship training courses)	
Student projects with businesses.	
Mobility of academics between science and businesses (eg Teachers from Industry; PhD in enterprises)	
Involvement of businesses in curricula development	
Lifelong learning, training courses	
Student mobility, career services (eg. work placements in businesses, experience abroad)	

12). Based on your experience, to what extent does each of the following methods have been used as a tool for transferring knowledge and technology in your organization?

	No or little extent	Some extent	Moderate extent	Great extent	Very great extent
Learning by doing					
Formal training, meeting					
Informal training, experience sharing					
Face-to-face interactions					

Documentation, manuals					
Best practices, lesson learned					
Information Technology					

13). would you summarize type of tech. transferred and values gained in the last years?

	knowledge and tech. transfer (planned)	knowledge and tech transferred (achieved)	Factors; if not achieved	Quantity if countable	Values gained
Human resource development					
Production process					
Production control					
Supply chain					
New product development					
Marketing					

14). Can you indicate the relation between knowledge and technology transfer needs and the area listed below?

	Very strong	Strong	moderate	weak	absent
Managerial					
Marketing					
Finance					
Human resource management					
Production (quality, variation,					
Machines (operation, maintenance,					

C). Action/Activity based questions

15). what activities are commonly practiced in your organization to transfer knowledge and technology?

16). Please try to rate the following points according to the actual practice of your organization.

	Very high	Moderate high	Medium	low	Absent
Ability to identify knowledge and technology gaps					
Accessibility of training centers					
Accessibility of trainers					
Accessibility of knowledge and technology transfer mechanisms					
Capability of trainers to transfer knowledge and technology.					
Capability of trainees to absorb knowledge and technology					
Availability of national policies for knowledge and technology transfer					
Capability of national policies to enforce knowledge and technology					
Willingness of foreign home companies to transfer their knowledge and technology to the host countries					
Time frame of trainings					
Repeatability of trainings					

17). what motives have been made to foreign investors (specifically in industrial parks) so as to transfer their knowledge and technology on their interest?

18). How much are related the actions taken to transfer knowledge and technology with that of national policy?

Highly related ☐ moderately related ☐ weak relation ☐ not related ☐

19). In your opinion, what are the main obstacles that delay or prevent cooperation and direct relations between host country governmental offices and the investors to transfer knowledge and technology? (Please encircle one to say "not an obstacle" and five to say "very big obstacle").

	1	2	3	4	5
Bureaucracy:					
Differences in organizational concept:					
Disagreements regarding intellectual property rights and IPR commercialization:					
Differences in research directions:					
Conflict of interest:					
Other (please describe):					

20). How would you evaluate the connection between host country and the industry, regarding the following mechanisms? (Please select from 1 to 5, 1 being "not relevant/rare", and 5 being "very frequent").

	1	2	3	4	5
The industry use of published research results					
Professional Training					
based on industry needs					
Consultation to industry					
Science Parks					
Cooperative research					

21). Can you scale the capacity of national knowledge and technology transfer policy?

Very high ☐ high ☐ medium ☐ low ☐

22). How do you rate the clarity and understandability of the national policy towards knowledge and technology transfer for all stakeholders?

Very clear ☐ clear ☐ medium ☐ not clear enough ☐

D). Actors/participants based questions

23). Is there any special institution that acts as a spill-over agent in our country?

Yes ☐ No ☐

24). who are the responsible bodies to transfer knowledge and technology in your organizational structure?

25). what types of relation do have the home country companies in industrial parks (Bole Lemi) to the host country (Ethiopia)?

Trade between firms
Production
Product development
Marketing
Technology transfer
social network

26). what value is added (result) by inviting foreign investors?

GTP increment

Foreign currency increment

Human resource development

Global market share increment

Local production capacity dep't

Better diplomatic relation

Research ability development

Manufacturing sector development

Please list others here: ----------

Job opportunity

27). How do you measure the effectiveness of the national policy on knowledge and technology transfer?

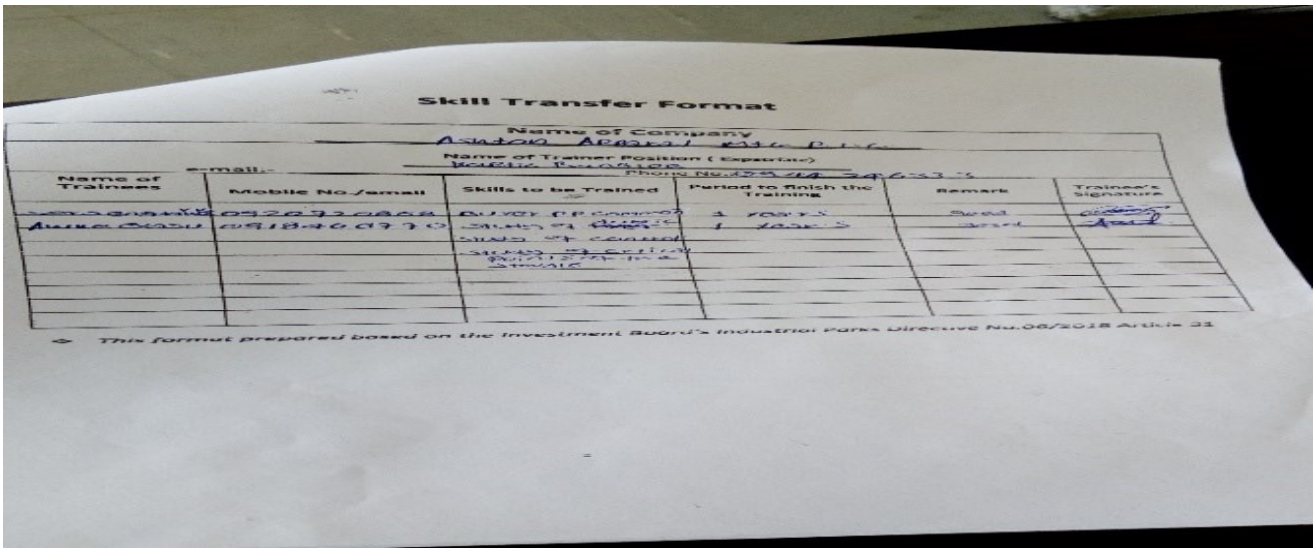
Very good ☐ Good ☐ not sufficient ☐ absent ☐

28). Can you mention the gaps (if there is) in transferring knowledge and technology regarding each responsible bodies?

29). As the employee and as the citizen of this developing country, what is your expectation towards knowledge and technology transfer?

- Methods Actions
- Actors

Annex II- skill transfer and training report format



Skill Transfer Format

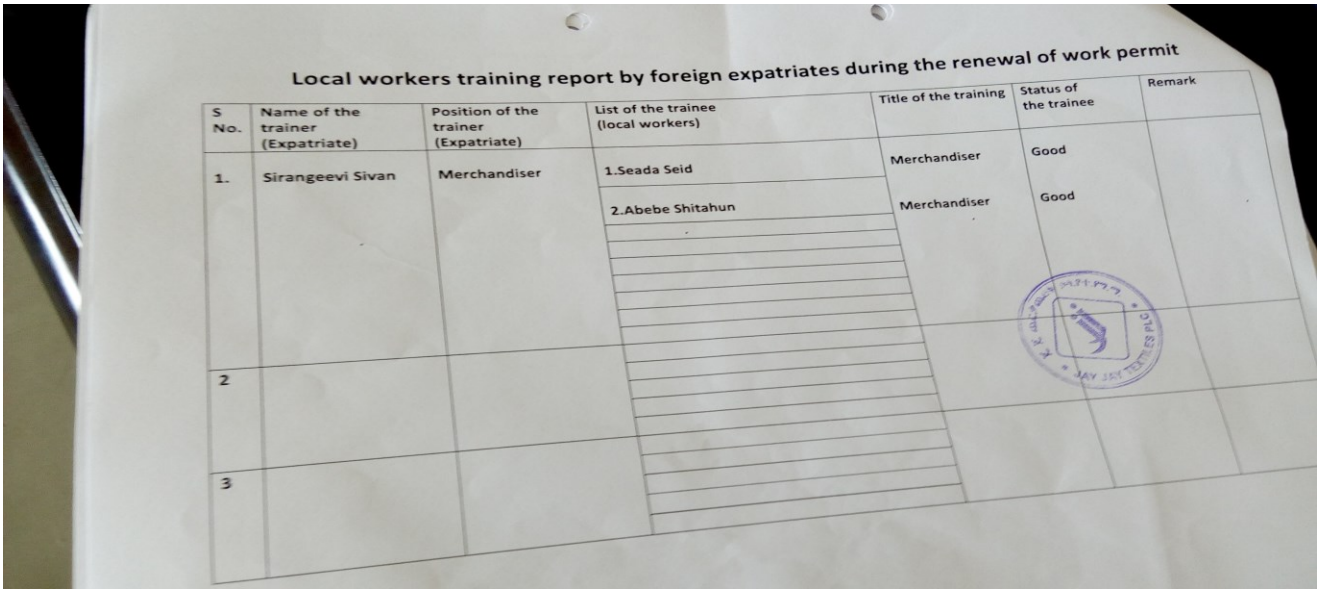
Name of Company

Name of Trainer Position (Expatriate)

e-mail:- Phone No.

Name of Trainees	Mobile No./email	Skills to be Trained	Period to finish the Training	Remark	Trainee's Signature

This format prepared based on the Investment Board's Industrial Parks Directive No.08/2018 Article 31



Local workers training report by foreign expatriates during the renewal of work permit

S No.	Name of the trainer (Expatriate)	Position of the trainer (Expatriate)	List of the trainee (local workers)	Title of the training	Status of the trainee	Remark
1.	Sirangeevi Sivan	Merchandiser	1.Seada Seid	Merchandiser	Good	
			2.Abebe Shitahun	Merchandiser	Good	
2						
3						

Annex III- Research Work breakdown

Table.1: research work breakdown

S.No	Activity	Estimated duration
1	Proposal development	4 weeks
2	Proposal presentation & verification	1 week
3	Questionnaire preparation	2 weeks
4	Selection of target area for data collection	1 week
5	Questionnaire distribution	1 week
6	Personal interview and discussion with target groups industries	4 weeks
7	Further literature reading	2 weeks
8	Answer collection	2 weeks
9	Data arrangement and coding	3 weeks
10	Progress presentation	1 day
11	Data analysis with further discussion	5 weeks
12	Formulation of recommended solution	3 weeks
13	Report preparation	2 weeks
14	Report verification	1 week
15	Thesis presentation	1 day

Annex IV- Research budget breakdown

Table 2: research budget breakdown

Resource		Estimated budget (ETB)	Remark
Materials /Tools/	Paper, pen	800	
	Audio & video recorder	5,000	To attend trainings, conferences, interviews, discussions, ...
	Flash	700	
	Online books, articles	3,500	Purchase
	Training manuals, agreements, …	2,500	Purchase and copy
Service	Printing, copy, binding,	3,500	Questionnaire, documents
	Typing	2,500	Data arrangement, reports
	Communication cost	1500	
Logistics	Transportation	3,000	To Industry park + organizations
	Coffee & tea cost	2,000	For external supporters
Total estimated budget		25,000 ETB	

Annex V- Activity network and Gant chart view.

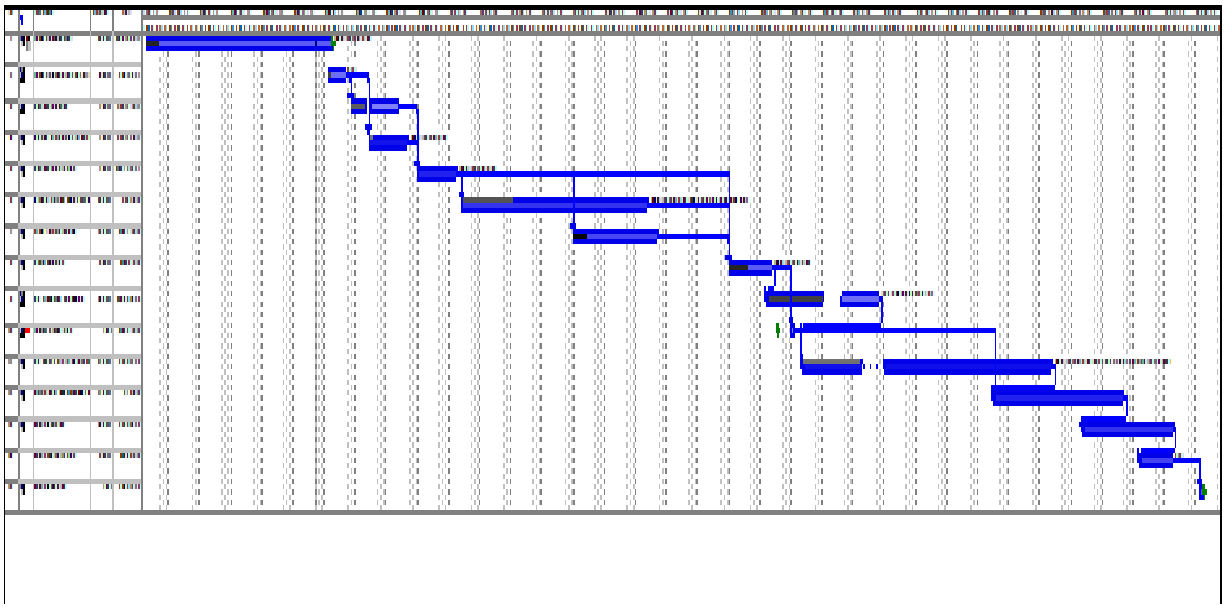


Fig. 7: Gant chart

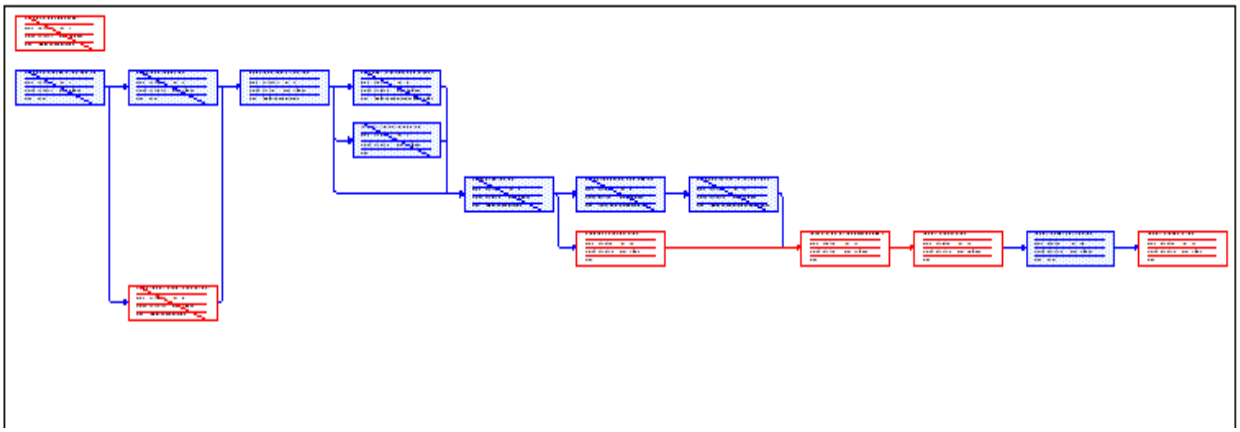


Fig. 9: activity network diagram