Knowledge Sharing Program

2016/17 Knowledge Sharing Program with Ethiopia:

Gearing up Ethiopia with Innovative Initiatives: Technology Transfer, Manufacturing, Urban Planning

Ministry of Strategy and Finance

KDI Korea Development Institute

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Preface

Knowledge is a pivotal driver of growth and the fruit of all endeavors dedicated to socio-economic development. Accordingly, knowledge sharing has become an essential tool in strengthening nations' capacity to design and execute policies and programs. On the global front, the UN is making efforts through its Sustainable Development Goals (SDGs) to underscore the role of both knowledge and knowledge sharing in tackling sustainable development issues and in establishing and enhancing global partnerships.

Indeed, knowledge laid the foundations for Korea's remarkable transformation from a poor agro-based economy into an industrialized nation with an open and democratic society. And the process, though arduous, has enabled Korea to accumulate invaluable and practical lessons not found in conventional textbooks. Now, as a global economic leader, Korea is working with the international development community and partner countries to identify key development challenges and solutions by sharing its tangible know-how and experience.

The Knowledge Sharing Program (KSP) was initiated in 2004 by the Ministry of Strategy and Finance (MOSF) and is implemented by Korea Development Institute (KDI). The program plays a vital role in further expanding knowledge sharing as well as in strengthening government partnerships with low to high income economies. As of this year, 940 research studies have been conducted with 59 partner countries. And in 2016, KSP policy consultations and capacity building workshops were organized with 28 partner countries including new partner countries such as Jordan and the Sub-Saharan Africa Partnership for Skills in Applied Sciences, Engineering and Technology (PASET).

The 2016/17 KSP with Ethiopia was undertaken by MOSF and the Ministry of Finance and Economic Cooperation of the Federal Democratic Republic of Ethiopia to support the formulation of the "Gearing up Ethiopia with Innovative Initiatives: Technology Transfer, Manufacturing, Urban Planning." To that end, KSP and Ethiopia engaged in a range of collaborative efforts including exchanging development experiences, conducting joint studies, and designing a policy action plan in line with the country's development targets.

It is with great optimism for the future of Ethiopia that the results of the 2016/17 KSP are presented. I firmly believe that KSP will serve as a stepping stone to further elevate the mutual learning and economic cooperation between both our countries, and hope it will positively impact Ethiopia's attainment of its goals for sustainable development.

I wish to convey my sincere gratitude to Senior Advisor Dr. Young Rak Choi, Principal Investigator Prof. Myung-Do Oh as well as project consultants Dr. Hee Cheol Cha and Dr. Inho Song for their extensive contributions. I am also grateful to Executive Director Dr. Kwangeon Sul, Project Manager Dr. Song Chang Hong, Project Officer Ms. In Hae Noh and all members of the Center for International Development (CID) for their hard work and dedication to this program. Lastly, I extend my warmest thanks to the Ethiopian collaborates, Ministry of Science and Technology(MOST), Ministry of Industry(MOI), Ministry of Urban Development and Housing (MoUDH) and related agencies, project coordinators, and participants for their steadfast effort and support.

Joon-Kyung Kim
President
Korea Development Institute (KDI)

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Chapter 3

2016/17 KSP with Ethiopia

In Hae Noh (Project Officer, Korea Development Institute)

Aspiring to become a lower-middle income country by 2025, the Federal Republic of Ethiopia implemented a five-year Growth and Transformation Plan (GTP I)(2010/11-2014/15) that served as the cornerstone of its rapid economic growth. As a result, it was able to achieve double-digit growth over the past decade, which was mainly driven by agriculture and the service sector.

Despite these endeavors and achievements, Ethiopia remains one of the poorest countries in the world. Its growth is modestly slowing down, projected to be 7.3% in 2017,[1)] and it faces economic challenges such as its manufacturing sector accounting for less than 5% of the GDP, its current account deficit increasing as a consequence of exports and GDP falling, and it has a low interest rate, thus low domestic savings, and low foreign exchange reserves—these pose major constraints upon the sustainability of this current growth.

For its potential with regard to low labor costs and relative political and economic stability, Ethiopia needs to make appropriate policies to take advantage of this momentum to pursue export-oriented development and achieve its vision. For that, they have formulated GTP II (2015/16-2019/20), with an emphasis on structural transformation from agriculture based economy to manufacturing. Within the government, Technology Transfer, Diversification of Industry, particularly with regard to textiles, and Urban Development are three areas critical to supporting Ethiopia's transition to more export-oriented and manufacturing-based growth. All three are areas to which the Ethiopian government shows strong

1) IHS Global Insight, country report (retrieved data on June 8, 2017)

commitment, but they are held back by their technical capacity and implementation gaps. With this background, the 2016/17 Knowledge Sharing Program (KSP) with Ethiopia was initiated in the above-mentioned areas to draw potential policy recommendations from Korea's development experiences.

The KSP with Ethiopia traces back to 2011, when it was first initiated with the Ministry of Strategy and Finance of the Republic of Korea (MOSF) and Korea Development Institute (KDI). In 2011, the KSP with Ethiopia was conducted under the theme of "Promotion of Micro and Small Scale Enterprises Sector and Improvement of Addis Ababa City Transportation System". With its successful completion of the KSP in 2011, cooperation continued between Ethiopia and Korea in the 2012 KSP under the heading "Strategy for the Implementation of e-Government and the Development and Promotion of the Leather & Footwear Industry of Ethiopia." In 2013, Ethiopia became a Strategic Development Partner Country (SDPC), which paved the way for a more comprehensive and profound research over the three years that followed. In 2013, research was conducted under the overarching title, "Growth and Transformation towards a Middle-Income Country," "Developing Action Plans for the Priority Agendas of the Second Stage of Growth and Transformation Plan" in 2014, and "Strategies for Effective Implementation of Second Growth and Transformation Plan (GTP 2)" in 2015.

Upon receiving requests for a KSP from the Ethiopian government in February 2016, the 2016/17 KSP with Ethiopia was launched with the theme "Gearing up Ethiopia with Innovative Initiatives: Technology Transfer, Manufacturing, Urban Planning" in coordination with Ministry of Finance and Economic Cooperation (MOFEC) of Ethiopia. The specific topics selected under the theme were as follows:

No.	Topics	Requesting Ministries	Name of Researchers (Organization)
Gearing up Ethiopia with Innovative Initiatives: Technology Transfer, Manufacturing, and Urban Planning			
1	Incentivized Measures for Developing Technological Capabilities through Technology Transfer in Ethiopia	Ministry of Science and Technology	Myung-Do Oh (University of Seoul)
2	Implementation of a Growth and Diversification Plan (GTP2) for the Manufacturing Industry: Diversification of the Textile Industry	Ministry of Industry	Hee Cheol Cha (Korea Institute of Industrial Technology (KITECH))
3	Establishment of Resilient and Inclusive Cities: Focused on Land Registration	Ministry of Urban Development and Housing	Inho Song (Korea Development Institute)

* Senior Advisor: Young Rak Choi, Former President of the Science and Technology Policy Institute, Former Advisor to the Ethiopian Ministry of Science and Technology
Principal Investigator: Prof. Myung-Do Oh, Professor, University of Seoul
Project Director: Dr. Song Chang Hong, Director for Planning and Evaluation, CID, KDI
Project Officer: Ms. In Hae Noh, Senior Research Associate, CID, KDI
Young KSPians: Ms. Su Min Son, Student, Sogang University, Ms. Ha Eun Lee, Student, Sookmyung University

In the first step of the 2016/17 KSP, the KSP team headed by Yong Rak Choi, the former President of the Science and Technology Policy Institute and senior advisor for the 2016 KSP with Ethiopia, visited Ethiopia from August 21st–26th in Addis Ababa, Ethiopia. The delegation met many high level officials at this time including H.E. Mekuria Haile (Ministry of Urban Development and Housing), H.E. Ambachew Mekonnen (Ministry of Construction), H.E. Gebremeskel Challa (Ministry of Construction), H.E. Ahmed Shide (Ministry of Finance and Economic Cooperation), H.E. Bogale Feleke (Ministry of Industry), and H.E. Afework Kassu (Ministry of Science and Technology) to attract their attention to this program and build common ground at its starting point. In addition, the team had a series of meetings with relevant institutions such as METEC, Ayka Company, Textile Industry Development Institute (TIDI), Addis Ababa Technology University, Addis Ababa ICT Agency, and the Ministry of Education to identify the most pressing challenges in their respective sectors and to build networks.

The second step was Local Reporting Workshop and Additional Pilot Study. A delegation of Korean experts headed by Dr. Song Chang Hong, the Director for Planning & Policy Consultation at the Center for International Development in the

Korea Development Institute, visited Ethiopia again from November 7th–11th, 2016 in Addis Ababa to obtain further information that was required for research and analysis. During the Local Reporting Workshop, Korean researchers and their Ethiopian counterparts respectively presented the Korean experience and Ethiopian situation, and special local experts were invited as discussants to provide the researchers additional comments and feedback. For the additional pilot study, the Korean delegation had extensive meetings with various relevant institutions including the Dan Lift Elevator Company, Ethiopia Civil Service University, Land registration Agency, and others. In addition, KDI co-hosted an additional seminar with the Ethiopia Development Research Institute (EDRI) on each topic to gain further insights, especially from academia.

From January 19th to January 26th, 2017, nine Ethiopian delegations headed by Mr. Kokeb Misrak, the Director of the Bilateral Cooperation Directorate at MOFEC, were invited to Korea for the Interim Reporting and Policy Practitioner's Workshop. The Interim Reporting Workshop was opened by Yong Rak Choi, the former President of the Science and Technology Policy Institute and senior advisor for the 2016 KSP with Ethiopia, and by H.E. Shiferaw Jarso, Ambassador of the F.D.R. of Ethiopia to the Republic of Korea. The Korean researchers presented the interim results of their policy consultation and received feedback from the Ethiopian delegation. For the Policy Practitioner's Workshop, Ethiopian delegations visited the most relevant institutions on research topics to gain first-hand experience and engage in networking opportunities with related Korean institutions. The list of visited institutions includes the Korea Research Institute of Standards and Science, the Korea Research Institute for Human Settlements, the LG Changwon Factory, the Masan Free Trade Zone, the Korea Apparel Testing & Research Institute (KATRI), the Korea Institute of Industrial Technology (KITECH), the Land & Housing Corporation (LH), and the Land and Geospatial InformatiX Corporation (LX). A follow-up seminar between the Ethiopian delegation and KDI was held on the last day of the workshop to reflect on the lessons learned during their stay in Korea and present their future efforts including action plans and roadmaps to promote the effective implementation of policy recommendations.

As a final step, a Senior Policy Dialogue & Final Reporting Seminar took place in Ethiopia from February 27th to March 3rd, 2017. The Final Reporting Seminar opened with opening remarks from Yong Rak Choi, followed by welcoming remarks from the Minister, Counselor, & Consul-General (DCM) of the Republic of Korea to Ethiopia and Kokeb Misrak, the Director of the Bilateral Cooperation Directorate at MOFEC. The final reporting seminar was attended by 100 participants, including government representatives, academics, policymakers, private companies, and other development agencies. They gathered to listen to the dissemination of the final KSP policy recommendations by Korean researchers,

Ethiopian local consultants, and policy practitioners. In addition, a Senior Policy Dialogue was held with H.E. Afework Kassu (Ministry of Science and Technology), H.E. Ahmed Abitew (Ministry of Industry), H.E. Bogale Feleke (Ministry of Industry), and H.E. Ambachew Mekonnen (Ministry of Urban Development and Housing) for more intensive discussions. These exchanges helped build trust mechanisms between the two governments and engender new discussions to identify opportunities for further engagement.

Based on the policy recommendations of the 2016/17 KSP with Ethiopia, MOST requested a follow-up seminar on "Technology Transfer" for building consensus among relevant officials before implementing the recommendations. Upon receiving this official request, the KDI agreed with MOSF, Republic of Korea, to conduct the 2016/17 KSP with Ethiopia Capacity Building Workshop under the theme "Technology Transfer Policy and Practices: The Comparative Experiences of Korea and Ethiopia." The workshop was held in Ethiopia August 22–27, 2017, with Young-rak Choi and Myung-do Oh, who introduced diverse incentive mechanisms for technology transfer and presented Korea's experience in the field. In this workshop, Ethiopian experts also presented their nation's technology transfer status for mutual learning. Attended by 30 participants from 20 institutions and ministries, the workshop was a huge success in giving those attending participants the opportunity to understand the concept of technology transfer, review past policies and formulate new ones. In addition, further engagements with MOST State Minister Afework Kassu are expected in devising a comprehensive policy toward technology transfer or forming an inter-ministerial committee.

The key objective of the KSP was to learn from and incorporate Korea's development experiences into the respective sectors in the creation and implementation of policies for Ethiopia. In that regard, KSP successfully achieved its purpose of delivering new knowledge and advice for both high- and technical-level stakeholders this year. Furthermore, KSP extended its network and impact by arranging further engagements, including hosting additional EDRI seminars and follow-up seminars for action plans. These new initiatives and approaches enriched the program to involve more diverse people and increase their ability to build capacity at multifaceted levels.

Executive Summary

Myung–Do Oh (University of Seoul)

Ethiopia is known as the country of the descendants of Solomon and the Queen of Sheeba. It is the only country in Africa that has a long history of approximately 3,000 years and has never been a colony of other countries. Its official name is the Federal Democratic Republic of Ethiopia. It has a population of about 90 million, ranking second in Africa and 14th in the world. Ethiopia has also been a special friend of Korea because it participated in the Korean War as part of the United Nations' coalition to help Korea during the crisis.

KSP 2016/2017 for high-level policy consulting for Ethiopian development was initiated according to the request articulated in the project proposal from the Ministry of Science and Technology (hereafter, MOST), the Ministry of Urban Development and Housing (hereafter, MoUDH), and the Ministry of Industry (hereafter, MOI) of the Federal Democratic Republic of Ethiopia (hereafter, Ethiopia) in March 2016 between the Republic of Korea (hereafter, Korea) and Ethiopia. At the Local Reporting Seminar and Additional Pilot Study among KDI, MOST, MoUDH, and MOI of Ethiopia in April 2016, the topics of KSP 2016/2017 that were reviewed and discussed, including how the directions and how their contents were different from the simple government's policymaking stage; these topics were covered in the previous KSP, where the focus was on the action plan embodied in an enriched plan that can be implemented in practice.

The first topic from the MOST, "Incentivized Measures for Building Technological Capability through Technology Transfer in Ethiopia," was discussed in order to

explore advanced experience and implications for Technology Transfer (hereafter, TT) in Korea, which has been successfully advanced. In light of Ethiopia's intrinsic environment and circumstances, the objective is to construct feasible incentivized measures that can effectively push the goal of Ethiopia GTP II in the market, focusing on incentive schemes to promote technology acquisition and assimilation through TT. Through comprehensive investigation and a multi-lateral approach to examining the characteristics of technology transfer in the developing country and Korea's industrialized experiences in the chasing period of technology, it is possible to: 1) identify features and experiences observed in technology development, channels of technology transfer, and technology chase; 2) investigate processes and implications to improve technology in indigenous enterprises; and 3) analyze policies and implementations to promote technology transfer in terms of incentivized measures.

This paper examines Korea's experience in terms of TT, which is recognized as the most important factor in industrial development through manufacturing. In particular, we have looked at policies and cases with incentivized characteristics in various aspects that can facilitate such TT. Most developing countries (hereafter, DC) are struggling to attract foreign technology and capital through FL and FDI in order to raise the economy, but in the early industrialization Korea, they maintained a different position, mostly depending on OEM and reverse engineering. That was a different policy direction to be considered in Ethiopia, which is mainly dependent on FDI. Based on Korea's experience, practical measures for enhancing the feasibility of sustainable TT were presented to supplement Ethiopia's policy as incentivized measures to speed up and facilitate the TT activities. The conclusion of this paper is that Ethiopia—a DC with a lack of technology and capital—should endeavor to raise and nurture indigenous-owned enterprises even in circumstances in which those enterprises can only depend on foreign capital investment in order to maintain sustainable development for the future. Indigenous-owned enterprises should focus on building the capacity of transferred technology and technology development. Ten practical incentivized measures for enhancing the feasibility of sustainable TT are recommended as applicable implementations to supplement Ethiopia's policy.

The second topic from the MOI, "Textile Industry Diversification Strategy Development Support," was addressed to seek ways to develop the direction of the textile industry in Ethiopia. It is recommended that MOI find ways to develop the textile industry through developing the structure of the current Ethiopian industry, which relies heavily on cotton fabric. Additionally, efforts should be focused on overcoming the limitation of the current manufacturers through the development of various textile products made with synthetic fibers. Furthermore, the textile industry's global competitiveness should be improved using an R&D center and HRD

system that are specialized to the textile sector.

Since 2010, the Ethiopian textile industry has shown rapid growth and became one of the country's key industries. Despite the fact that the Ethiopian textile industry has the important role of increasing GDP, the Ethiopian government is behind in achieving the expected target for export and employment, in which low local technology levels, low productivity, and low quality, among other factors, have been recognized as difficulties.

This research has an implementation role as a foundation survey and an action plan consultation, among other roles, related to the industrial and structural development of the textile industry—as requested by the Ethiopian government—by sharing information based on the development experience of the Korean textile industry.

Based on that, the direction of development is suggested to contribute the vitalization and development of the growing Ethiopian textile industry in the following ways: 1) developing the current cotton industry's structural development through the Ethiopian government's support for policies that promote productivity, the use of a cotton grading system, and quality control; 2) developing various textile products that use synthetic fibers (e.g., polyester production is possible using spinning facilities with imported chips, but a careful approach and measurements are required considering global competitiveness; 3) the creation of a R&D center specializing in textiles and the establishment of a HRD system to implement technology support, training for professionals, piloted product development, the creation of fashion/clothing, and marketing through R&D activities, which could be done through a technology cooperation with countries that have advanced textiles industries; and 4) establishing global standard testing via an international certified testing institute, developing an inspection system that can contribute high value to Ethiopian textiles products by providing a certification service for textiles, clothing, and leather-related products.

The third topic from the MoUDH, "Establishment of Resilient and Inclusive Cities: Focusing on the Land Registration," was addressed as a way to seek policy measures for modernizing land registration systems to make the exchange of and access to land use and planning quicker. Ethiopia is still among least urbanized countries in the world. However, the level of urbanization and urban development in this country has recently increased at an alarming rate. For successful urbanization, a well-functioning and modernized land administration system is needed. For cities to provide public services that match the increasing urban population there needs to be well-functioning markets, such as for land. Moreover, there is a need to engage the urban population in development and governance, which in turn enhances

public-private partnerships and decentralizes administration for cities so that they can administer themselves. This requires creating stronger local capacity for cities to develop and manage urban infrastructure and services, and delivering them more effectively and efficiently. However, only a small proportion of urban land has legal cadaster in the country. Therefore, land registration is one of the major elements of land administration and land policy in Ethiopia. Consequently, it is important to: 1) understand the history of land policy in Ethiopia to successfully renew the land administration system, 2) review the Ethiopian land information system and the Korean land information system, and 3) help Ethiopia overcome its land system challenges by recommending policy changes and successfully formulate a land information system.

By considering Korean experiences, a series of procedures were suggested in the study. The steps in this procedure are: 1) reform existing organizational structures from central to local levels; 2) create awareness by giving full information to communities, institutions, and other stakeholders about the land information system; 3) perform pilot tests from land at central and local levels; 4) apply land digitalization by collecting all information about pilot land; 5) evaluate and revise the above steps, develop steps to strengthen any drawbacks, and make all necessary corrections; and 6) reapply land information both at central and local levels using all available resources.

Regarding the capacity challenge, reforming institutions and initiating collaboration with research institutes and universities are needed. Collaboration with institutions was successful in the establishment of the Korean land information system. As noted above, the organizational structure and legal framework challenge can be easy to solve because they are governmental matters and can therefore be addressed by forming a new establishment, formulating a new law, or preparing a new procedure manual.

Based on the experience of Korea, three topics were carefully implemented in close cooperation with Ethiopian government partners and taking into consideration the business environment and constraints of Ethiopia. All research processes and results to provide Ethiopia with innovative initiatives were shared with the Korean specialists and the Ethiopian parties, as well as the local consultants who addressed the three topics. The field study, kick-off meeting, and interim and the final conferences were held in Ethiopia. On-site feedbacks, comments for each topic and strict evaluation procedures by specialists were valuable for enhancing the quality of the contents and for complementing the practices in Ethiopia's field and market.

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Technology Transfer, Manufacturing, Urban Planning

Chapter 1

Incentivized Measures for Building Technological Capability through Technology Transfer in Ethiopia

Incentivized Measures for Building Technological Capability through Technology Transfer in Ethiopia

Myung-Do Oh (University of Seoul)
Endalew Mekonen Alemae (Ethiopian Standards Agency)

Summary

Technology transfer (TT) is generally difficult to quantify or measure, as it inherently proceeds in various forms and through diverse channels; it has limitations for the evaluation of the specific flow of content and contributions to market price. However, the experience of TT in Ethiopia is in the first phase, so it is necessary to focus on setting specific targets and the roles and strategies involved in implementation at the initial stage. It has already been revealed through research and experience that efficient TT and skills acquisition in indigenous industries are essential for long-term economic growth and stable job creation in developing countries (DCs).

This paper seeks to explore the advanced experiences and implications in Korean TT, which has been successfully advanced. In light of Ethiopia's intrinsic environment and circumstances, the objective is to construct feasible incentivized measures that can effectively push the goals of Ethiopian GTP II to the market, focusing on incentive schemes to promote technology acquisition and assimilation through TT. Based on the investigation, we have created a comprehensive approach to examining the transferring of technology characteristics in the DC and Korea's industrialized experiences in the chasing period of technology and finally propose ten applicable policy recommendations for implications in Ethiopia.

This paper contributes to the discussion of the gap in Ethiopia's current TT. More

specifically, this paper identifies the gap between current TT policies and actual TT practices in Ethiopia. For this, we both discuss the development of Ethiopian TT policy and provide in-depth analysis of actual TT practices. Our findings indicate that national policy does not fit well with current actual TT practices.

The main focus of this paper is reviewing Korea's experiences as practical lessons to apply in Ethiopia in terms of TT, which is recognized as an important factor in industrial development through manufacturing. In particular, we have looked at policies and cases with incentivized characteristics in various aspects that can facilitate such TT. Most DCs struggle to attract foreign technology and capital through FL and FDI to raise the economy, but in its early industrialization, Korea maintained a different position that mostly depended on OEM and reverse engineering. That represents a different policy direction that Ethiopia may consider, one that is mainly dependent on FDI. Based on Korea's experience, practical measures for enhancing the feasibility of sustainable TT are recommended to supplement Ethiopia's policy as incentivized measures to speed up and facilitate TT activities.

The conclusion of this paper is that Ethiopia, a DC that lacks technology and capital, should endeavor to raise and nurture indigenous-owned enterprises even in circumstances in which it can only depend on foreign capital investment to maintain sustainable development in the future. Meanwhile, indigenous-owned enterprises should focus on capacity building in transferred technology and technological development.

In addition, indigenous-owned enterprises can digest the mature technology of industrialized countries, so the stage of technological imitation can be shortened to the stage of their own technological development, and the government should create long-term policies without impatience for private indigenous-owned companies to develop their own designed products. The systematic provision of predictable but consistent long-term incentivized measures that can be implemented and customized in various ways is necessary. Ten practical incentivized measures for enhancing the feasibility of sustainable TT are recommended as applicable implementations to supplement Ethiopia's policies.

1. Introduction

1.1. Demand Identification

Ethiopia known as the country of the descendants of Solomon and Queen Sheeba, is the only country in Africa that has a long history of 3,000 years, and has never been colonized by another country. The official name of Ethiopia is the

Federal Democratic Republic of Ethiopia and it has a population of approximately 90 million, ranking second in Africa and 14th in the world. Ethiopia has been a special friend of Korea since Korean War because Ethiopia participated in Korean War as a part of the United Nations coalition to help Korea in crisis. Ethiopia is a federal nation consisting of Oromo, Amhara, Somali, and Tigray ethnic groups, with nine regional states and two city states as one country.

The federal government and tribal-based local governments are troubled; tribal interests cause national conflicts, and federal-funded projects are not implemented effectively in all states. Ethiopia is an ocean-free landlocked country that shares borders with Eritrea, South Sudan, Kenya, Somalia, and Djibouti, with a land area five times that of the Korean peninsula. Ethiopia has experienced an average of 10% or greater economic growth between 2002 and 2014 based on these human and natural resources.

Before establishing policies and measures for effective TT in Ethiopia, we had heard about Ethiopia's situations through domestic experts, who used to live in Ethiopia, to reflect the opinions on the project proposal. Ethiopia's GTP (Growth and Transformation Plan) is a five-year plan for economic development in Ethiopia. It is the opinion of experts that Ethiopia, as a federal state, is more concerned with growth than development to maintain its regime. The content of GDP growth primarily consists of construction projects for agriculture and infrastructure. The reason is that the federal government is leading the growth of the state in regime maintenance and it has judged that the development of a competitive private sector is not planned. Therefore, growth is mainly driven in agriculture and infrastructure construction projects that are relatively distant from the regime and from politics.

Recently, the Ethiopian government has planned to develop GTP II, which is at the second stage of a national development strategy, through the GTP I development plan, and has aimed to become a middle-income country by 2025. Under this plan, the Ethiopian government is making overall efforts to achieve this goal through the structural transformation of Ethiopia. However, Ethiopia's industrial structure is mainly focused on the enrichment of industry, which is its primary industry, and there are many problems to overcome such as the chronic trade deficit. Although it is currently inferior, the future manufacturing sector is pursuing the GTP II plan with the aim of taking a leading role in Ethiopia's economic development.

National capital accumulation and technology potential must be prepared to move from an agricultural economy to an industrial economy. In this regard, the capital accumulation of the Ethiopian government seems poorly established, and

FDI is emphasized as primary means of attracting capital and TT for the country's industrial development. The Ethiopian government has already experienced the failure of FDI in agriculture. The result of attracting large-scale agricultural investment from foreign companies in the expectation of increasing employment and acquiring skills through FDI was a failed experiment. There was an insufficient increase in employment, minor technology transfer, and provisioning through FDI. Meanwhile, TT from developed countries is a known effective method of acquiring new knowledge in DCs with a weak manufacturing base. Particularly in Ethiopia, where Korea has been selected as a major developing country for intensive cooperation and assistance to help in Africa, TT is becoming more important, as it is the key to sustainable economic development.

TT is generally difficult to quantify or measure, and proceeds inherently in various forms and through diverse channels; it is difficult to make a specific flow of content and contributions to market prices. However, the experience of TT in Ethiopia is in its first phase, so it is necessary to focus on setting specific targets, roles, and execution for who, what, and how to implement in the beginning stage. It has already been revealed through research and experience that efficient TT and skills acquisition in indigenous industry are essential for long-term economic growth and stable job creation in DCs.

1.2. Research Design

This paper seeks to explore advanced experiences and implications for TT in Korea, which has been successfully advanced. In light of the intrinsic environment and circumstances of Ethiopia, the objective is to construct feasible incentivized measures that can effectively push the goals of Ethiopia GTP II to the market, focusing on incentive schemes to promote technology acquisition and assimilation through TT. Through comprehensive investigation, we have created a multi-lateral approach to examine the transferring of characteristic technologies in the DC and Korea's industrialized experiences in the technology chasing period.

1) Identify the features and experiences observed in technological development, channels of TT, and technology chasing level.
2) Investigate the processes and implications with which to improve technology in indigenous enterprises.
3) Analyze policies and implementations to promote technology transfer from the perspective of incentivized measures.

In the course of this research, we have focused on foreign direct investment (FDI) and foreign technology licensing (FL), which are the channels of formal TT in DCs and considered the necessary options for Ethiopia to promote the development

of import substitution technologies. In addition, we have examined the major channel of informal TT such as Original Equipment Manufacturing (OEM) and reverse engineering, which have been emphasized in technology development cases in Korea; finally, we propose applicable policy recommendations for TT promotion to complement the existing formal TT based on experiences in Korea.

Most DCs are interested in policy incentives to promote FDI, but the scope of the incentives in this report is not narrow, but rather extends to include diverse policies in all areas with incentive nature to drive TT.

1) Incentives that encourage investment
2) Reduced risk (fixed tariffs, stable exchange rate, guarantees, etc.)
3) Increased information exchange
4) Alignment of actor interests in the market chain
5) Clear, consistent, and long term market signals
6) Entrepreneurship and education
7) Integrated planning

Based on the experience of Korea's early industrialization process, this paper was implemented in close cooperation with Ethiopian government partners, taking into consideration Ethiopia's business environment and constraints. All research processes and results were shared between the Korean researchers and the Ethiopian parties, and feedback was provided through mutual evaluation to enhance and complement the practices in Ethiopia fields and markets.

The objectives of this research were achieved using research methods based on the following: Ethiopia's status, data, and information in related domestic and overseas reports, papers and presentations, and exchanges of opinions with relevant institutions and experts.

1) Implementation plan for GTP II in the manufacturing sector
2) Policies and practices associated with Science, Technology and Innovation (STI) in Ethiopia
3) Man-power potentials related to manufacturing sectors in Ethiopia
4) International trading statistics and flows of imported and exported commodities
5) Business environments/constraints and ongoing solutions for FDI and the acquisition of technology in Ethiopia
6) International trading realities in the market that focus on imported and exported commodities
7) Current policies and practices of TT in MOST, MOI, MOE, and MOFEC; focusing on prioritizing and acquisition mechanisms related either to FDI and FL or to

other forms

The specific implementation of this project was conducted through field-oriented surveys and information exchanges centered on government agencies and local experts, through local visits to Ethiopia. The KSP team selected a local consultant for each research subject by travelling to Ethiopia on 20–27 August, 2016 and visiting the project proposal ministry. The KSP team invited local experts to participate in the project's kick-off seminar in which the KSP team's investigators conducted field surveys and interviewed three local experts who had been recommended by Ethiopia's Ministry of Science and Technology (MOST) and the Ministry of Finance and Economy (MOFEC) to select the most suitable local consultant for the subject. The selected local consultant was Mr. Endalew Mekonen (hereinafter referred to as the local consultant), who was the Director General of the Ethiopian Standards Agency.

The local consultant searched for and reviewed data on the sub-topic in Ethiopia. The KSP team revisited Ethiopia in 5–10 November 2016. The KSP team held a local seminar on the ongoing tasks until that time and hunted for comments and suggestions from selected Ethiopian panelists on the assignments. The KSP team visited government departments and local enterprises in Addis Ababa during Local Reporting Seminar and Additional Pilot Study. Incentivized measures for developing technological capacities through TT in Ethiopia, which is the core mission of this research subject, were proposed by sharing the joint reviews and commentary by Korean experts on Ethiopia through the proposal and interim report with the perspective of their feasibility and local applicability. The final report for this project was prepared through these procedures.

1.3. Organization of the Paper

The subject of analysis and content according to the scope of this research project are as follows:

1) The current situation in Ethiopia

This part analyzes the problems and limitations inherent in Ethiopia's implementation of TT.

a) Incentive policy and implementation of TT in Ethiopia
b) The trade of real goods related to international exports and imports in Ethiopia
c) Ethiopia GTP II FDI statistics according to nine sectors and their effects
d) Implementation of incentives to promote technology acquisition through TT

in Ethiopia

2) Korea's industrialization experience and lessons

Focusing on TT in the early stages of industrialization in Korea, Korea's industrialization process started in the harsh environment and conditions after the Korean War, and can be examined from the perspective of the policies, practices, and expansion of TT.

a) Korea's trajectory with regard to technological developments
b) Characteristics of TT in Korea
c) Incentive scheme and analysis of its effects as applied in Korea's industrialization era
d) Implications based on Korea's TT experience

3) Policy recommendations for Ethiopia

We propose feasible incentivized measures that will lead to the implementation of efficient technology acquisition methods in Ethiopia's applicable policies by cultivating the ability to absorb technology that has been transferred from developed countries.

a) Prioritize and emphasize policies that identify TT
b) Investigate incentivized measures that promote TT
c) Ensure the sustainable application and implications of proposed policy recommendations

2. Definition and Channels of Technology Transfer

Technology transfer (TT) is generally difficult to quantify or measure because it proceeds inherently in various forms and through diverse channels, and it is difficult to create a specific flow of content and contributions to the market price. As a result, the flow of information and knowledge about technology are varied and wide ranging and TT should be treated as an intrinsically multi-lateral process.

TT can be understood as a form of narrow process or general processes in which technological assets are transferred. The narrow definition of TT is a process for conceiving and implementing a new/novel application for an existing technology. The general definition of TT is the set of processes that include all dimensions of the origins and the adoption of expertise, experience, and equipment among, across,

and within countries, organizations, and institutions.

Therefore, TT processes involve physical, capital, and human resources through knowledge, skill, and information, which can lead to improvements in production, manufacturing, management, and marketing.

We should note here some of the characteristics of TT.

1) Recognize the slow adoption of technologies that support sustainable development despite many initiatives for the intensive and effective transfer of technologies.
2) The need to focus on any methods that facilitate technology adoption.
3) Realize the absence of a ubiquitous approach. The need to prioritize initiatives for DCs depending on their needs and statuses.

With regard to TT, the situations of technology importing, technology infrastructure, technology acquisition, and the availability of skilled manpower in the DC are mentioned in terms of technological competitiveness such as technology imports, technology infrastructure, technology acquisition, and the availability of skilled manpower.

1) Technology imports
   a) A few developed countries provide most innovative technologies. Most DCs neither innovate nor adopt innovations.
   b) DCs lack the capability to produce globally competitive technologies.
   c) DCs lack information about emerging technologies and innovations.

2) Technology infrastructure
   a) R&D institutes and testing facilities in DCs are of poor quality compared to those in industrialized countries.
   b) There is a lack of collaborative research
   c) Universities and R&D applications are isolated from industry

3) Technology acquisition
   a) Unit-level technology absorption is low.
   b) There is a lack of incentive, direction, and capability to update existing technologies.
   c) There is a lack of ready access to capital.
   d) There are relatively high transaction costs.

4) Availability of skilled manpower
   a) Shortage of trained people

b) Lack of continuous capacity building for manpower in technical sectors
c) New technologies are not widely adopted due to a lack of skilled people, thus widening the technology gap.

TT, which flows into DCs that lack capital and technology, is largely influenced by both formal and informal channels. The formal channels of TT that are traditionally accepted in academia are mainly the FDI channel, which mainly runs from advanced countries to DCs, and the FL channel, which flows through contract procedures for the introduction of specific technologies between developed countries and DCs. Meanwhile, all other channels that do not belong to the formal channels in TT are called informal channels. Among them, OEM and Reverse Engineering, which are recognized as important routes in DCs, especially in East Asian countries such as Korea and Taiwan, are noted in this paper.

<Table 1-1> shows the TT channels that are observed in DCs. One particularly noteworthy thing here is that TT in Korea at the beginning of industrialization proceeded mainly through informal TT channels such as OEM and reverse engineering, whereas Ethiopia currently relies on FDI for TT.

〈Table 1-1〉 TT Channels in Developing Countries

Form	Channel	Feature
Formal	Foreign Direct Investment (FDI)	Ethiopia is oriented towards FDI Packages
	Foreign Licensing (FL)	
Informal	Original Equipment Manufacturer (OEM)	Korea is predominantly oriented towards OEM and Reverse Engineering
	Reverse Engineering	
	Movement of People	

Source: Compiled by the Author.

2.1. FDI and FL

In DCs where capital and technology are severely lacking, FDI from foreign countries is the preferential channel in industrialization. In fact, many DCs have overcome the limitations of developing nations through the inflow of capital via FDI.

Looking at the domestic inflow of FDI, DCs in the early stages of economic growth play a very important role in capital formation under lacking situations with regard to domestic capital. Other positive effects of FDI include productivity

improvements, TT to the domestic market, management technology, new processes and expertise, the training of workers, international production networks, and market access. Although the introduction of FDI has a constructive role in DCs, it should be recognized that it does not automatically guarantee national economic development, depending on the conditions and content of FDI.

Therefore, rather than attempting to introduce FDI from foreign countries unconditionally, it is necessary to evaluate the effectiveness of FDI and their impacts on the market and supply inducing incentives to stakeholders related to FDI with intended but flexible options regarding negotiation that focuses on technological developments.

There are three types of FDI, and proper incentives should be specialized for each type to attract FDI.[1)]

1) Resource-seeking FDI: it is generally known that this type of FDI has a negative effect and a limited impact on the economic development of an upcoming country.

2) Market-seeking FDI: this type of FDI is positive on the economic development of a DC due to its own market size. Incentives to induce such FDI such as the market advantage type, which allows a monopoly on a market and the regulation of other companies' entry into that market can be described as favorable.

3) Efficiency-seeking FDI: this type of FDI has the greatest impact on the economic growth of an emerging country, not on the market of the country of origin but on the industrial conditions of the country to which it is introduced. The incentives to induce such FDI such as financial support–type tax exemptions and tariff refunds on imports and exports can be described as favorable.

FDI can contribute to economic growth by promoting the formation of domestic capital in strategic sectors of industry in host countries. In addition, FDI is known as having a positive effect on facilitating indirect economic growth by promoting trade because FDI companies were generally found to be more active in trade activities than domestic ones. Therefore, FDI inflows will facilitate trade activities in host countries and indirectly affect economic growth. Meanwhile, FDI in commercial areas can induce an increase in service sector employment rather than the manufacturing sector. Resource-seeking FDI has limited impact on the economy

1) Cecile Fruman, "Why does efficiency-seeking FDI matter?", 02.05.2016, World Bank Blog

of the incoming country.

2.2. OEM

An Original Equipment Manufacturer (OEM) manufactures products to be sold by attaching the trademark of an orderer according to their requests. This is also called foster production. OEM production companies can establish a foundation with which to secure capital and pursue technology by securing markets in advanced countries such as by saying "No face but no recession".

The transformation of latecomer small- and medium-sized enterprises (SMEs) from dependent or subcontractor original equipment manufacturing (OEM) firms into independent or original brand manufacturing (OBM) firms is possible by achieving a significant catch-up in their share of regional or global markets. These SMEs create their own paths instead of following their forerunners; these paths are neither entirely new nor take the form of leapfrogging, but are characterized by new combinations of existing paths.

An Original Design Manufacturer (ODM) is a more advanced concept of OEM; this is a step forward in a passive manner of production according to a customer's designs, which means that the manufacturer processes everything from the design stage to completion. Often, this is how OEM companies such as well-crafted and well-trained professional manufacturers use ODMs.

2.3. Reverse Engineering

The literature that has studied technology strategies for industrialization considered the policies that were experienced by DCs such as Korea and Taiwan.

Duplication policy refers to all policies related to TT and investment capabilities for industrialization; this leads to assimilation before invention. Policies stimulate experience-based learning of technology that has initially been transferred from abroad. Meanwhile, invention policy refers to all policies that are related to the acquisition and utilization of development capabilities that enable technological innovation.

Reverse engineering in the market by implementing duplication policy can be incorporated with three actions from the perspective of the TT process.

Technology acquisition is the acquisition of technology via importation. Domestic manufacturers who have been behind technology acquire technical data in a printed form such as a catalog, design drawings, technical reports about

products of interest from foreign countries, and information about parts.

Technology assimilation is an accumulation of expertise via localization. The technical data and imported product information that are acquired by domestic manufacturers have been localized into the product technologies through a repetitive imitation production process that involves disassembling an imported product into its component parts and copying and producing the finished product, thereby accumulating technology production expertise.

Technology improvement refers to the enhancement of technology by a local maker through gaining advanced information from exporting firms. Domestic manufacturers establish a production process that can be applied in the domestic market through the localization of a production technology via the simulation of such technology. Based on information about advanced production products, it improves existing production technologies and parts when it reaches the stage of producing economical commercial products through skilled management and manpower.

Policies are related to capability acquisition for major innovations and the utilization of these capabilities for major innovations. Policies also include selectivity among generic technologies (through the funding of joint public–private R&D efforts and incentives for technical training and firm-level R&D).

3. Identification of Potential Policies and Practice of Technology Transfer in Ethiopia

This section contributes to the discussion of the gap in current TT policies. Specifically, this paper identifies the gap between current TT policies and actual TT practices in Ethiopia. For this, we both discuss the development of Ethiopian TT policies and provide an in-depth analysis of actual TT practices. Our findings indicate that national policy has a poor fit with the current actual TT practices.

3.1. Objective and Methodology

There are two main strategies among those incorporated under STI policy concerning TT: Establishing a system that enables searching, selecting, importing, customizing, using, and disposing of foreign technologies and using FDI and other TT methods; strengthening the technological information exchange among institutions and the use of intellectual property, standards, and other related information for TT.

In the Ethiopian context, TT refers to the process of transferring technology or work methodologies that have been created and tested by other parties to receiving parties through capital and intermediary goods, trained human power, or technical and trade information. The process of transference includes directly using, copying, and customizing technology. TT focuses on building technological capacity in sectors that have obtained prior attention at the national level.

The government understands that the technology is a pillar of development; thus, it has carried out various supportive activities. Taking technology transfer as a major implementation strategy, metal and engineering corporations have actively participated in the process of technology transfer by engaging in producing power generating, distributing, and regulating equipment, participating in activity of generating from wind and other such renewable power sources, and producing city and cross-border buses and other light and mid-range vehicles to alleviate the transportation shortage.

Keeping the strengths shown in the process of implementation, the following gaps that require special attention in light of the leading TT direction are analyzed depending on when and what type of capacity must be built; this is not analyzed for individual sectors, instead it is hoped that this might set a general direction for TT.

In this paper, we aim to assess the degree to which the criticism that TT policy is not fully implemented will be justified. We take two steps here; first, we assess the actual practices of TT through different channels and consider the extent to which a gap is present. Next, we present a comprehensive overview of the development of Ethiopian TT policy from 2012 to the present and consider how far it addresses the gap in TT practices in Ethiopia.

Objective

This section is going to identify the potential policy and practices of TT in Ethiopia. The specific objectives of the study are as follows:

1) Identify the gap between the policies and the practices in TT
2) Analyze international trading and commodity production in the market
3) Search the statistics on FDI and Impact in nine industrial sectors of GTP II
4) Identify the implementation incentives for the acquisition of TT

Survey Data

Analyses of the gap between policies and the standard practice of TT will be based on original data and literature review from different scholars. Two related

questionnaires were developed; one aimed at policy makers and one at industry researchers.

Methodology

Using the data obtained from the policy maker and industry researcher questionnaires, three steps were followed to explore diversity in TT channels as well as the existence of structural disciplinary and sectorial patterns of TT (in terms of TT channels used and barriers to enact useful policy initiatives experienced).

3.2. Identification of Gap between the Policy and the Practices in TT

3.2.1. National Technology Policy of Ethiopia

Technological sophistication and TT will play a crucial role in delivering the goals laid out in the Government of Ethiopia's Growth Transformation Plan (GTP). The issues of TT primarily focus on devising a system of learning, adapting, and utilizing as well as disposing of imported technologies in order to meet national demand. However, most TT activities currently carried out in Ethiopia are not in line with the envisaged technology demands of the development programs. In general, the national capability to learn, adapt, and utilize foreign technology is still at a very early stage.

Implementing Strategies

There are limitations in exhaustively using FDI contract license agreements by concluding agreements with large foreign companies that have brands and other international TT strategies. The following are the major strategies stated under the STI policy.

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 of imported technologies should be established and implemented.
3) Establish and implement a system to use FDI and other ways of supporting TT.
4) Strengthen TT among various manufacturing and service providing enterprises.
5) Strengthen wide use of intellectual propriety, standards, and other related information in support of TT.

However, the STI policy is too general. Therefore, Ethiopia should have a separate technology transfer policy in order to avoid missing out on various types of gaps that are present in actual TT practices. In addition, Ethiopia should have TT centers to foster technology absorption in Ethiopian enterprises.

3.2.2. Practices of Technology Transfer

There is little insight as to the degree to which policy matches with current standing technology transfer practices. Import of capital goods gets increasing and increasing from time to time in Ethiopia. The cost incurred for importing capital goods accounts for the lion's share in the total national product. Those imported technologies are not used for TT.

Technology management process in Ethiopia is not compatible with the technology capacity that proposes to build. Accordingly, the technology management process should be strengthened in line with building technological capacity. Even though some TT activities are carried out by the government and private sector, there are great limitations to coordinating those individual efforts.

The government understands that technology a necessary pillar of development. As a result, it has carried out various activities. By taking TT as the major implementation strategy, the Metals and Engineering Corporation (METEC) actively participates in the process of TT, engaging in producing power generating distributing and regulating equipment, wind and other renewable power generation, producing city and cross-border buses and other light and mid-sized vehicles, in order to alleviate the shortage of transportation by establishing the following listed major industries:

- Adama Agriculture Machinery
- Akaki Basic Metals Engineering
- Bishoftu Automotive Engineering
- Dejen Aviation Engineering Industry
- Ethiopian Plastic Engineering Industry
- Gafat Armament Engineering
- Homicho Ammunition Engineering
- Hi-Tech Engineering Industry
- Hibret Machinery Building
- Metals Fabrication Engineering
- Ethiopian Power Engineering
- Locomotive Engineering Industry
- Infrastructure Machinery
- Special Tool and Research

METEC is one of the institutions established by the Federal Democratic Republic of Ethiopia (FDRE) to enable the realization of the GTP and to accelerate the ongoing transition of Ethiopia into industrialization and becoming a middle-income country. Since the establishment of METEC as a public enterprise by the Council of Ministers regulation number 183/2002, METEC has been working tirelessly towards the realization of Technology capability in Ethiopia.

Most of the METEC companies are involved in three forms of TT mechanisms. Meanwhile, most of them are co-production oriented. Therefore they need to be aggressively working on foreign licensing and reverse engineering to build up local technology capability.

1) Co-production
2) Foreign licensing
3) Reverse Engineering

3.3. International Trading and Commodity Production in the Market

3.3.1. Production and Processing of Commodities

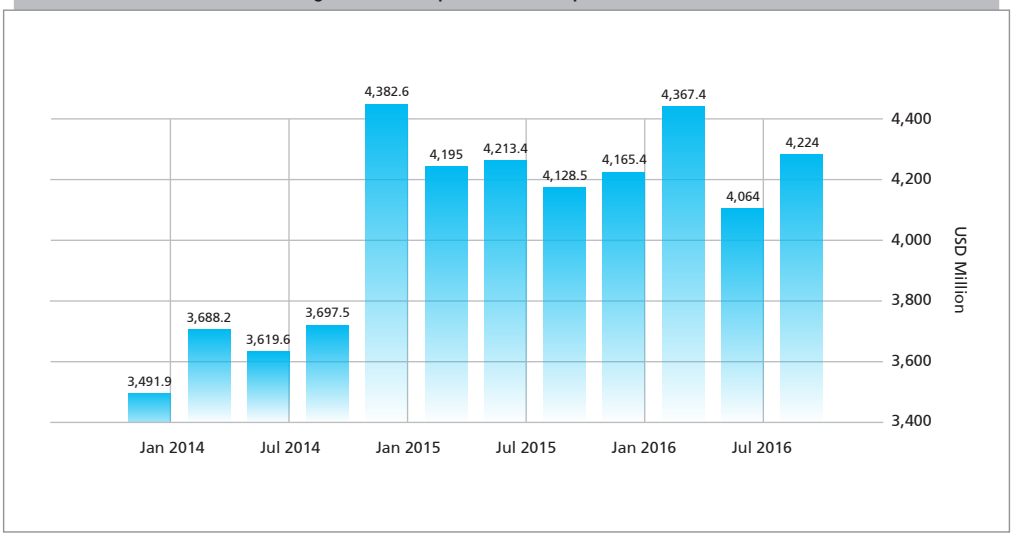
Growth in the production of agricultural commodities in general has been relatively slow, because demand is not very sensitive to increase in income. Ethiopia has made progress towards its main economic growth goals through increasing the degree of processing of its commodities. The increase in agricultural production is related to the purchasing power of consumers. Agricultural processing is the sector that starts when self-sufficiency of basic food supply is attained and quantities are produced above this level.

Therefore, as the purchasing power of the people increases due to the development of the manufacturing industry, the demand for agricultural products increases, so the production increases and the processing industry develops.

3.3.2. International Trade in Commodities (Ethiopia's Export and Import)

Imports in Ethiopia increased to $4382.9 USD Million in the first quarter of 2015 and maintained a similar level of imports up to 2016, which was relatively higher than the previous year as shown in [Figure 1-1]. Ethiopia's main imports are foodstuffs, textile, machinery, and fuel. Ethiopia's main trading partners are China (18 percent of total imports), Saudi Arabia (13 percent), United States (9 percent), Russia, and India.

[Figure 1-1] Imports in Ethiopia (2014-2016)



Source: National Bank of Ethiopia, www.tradingeconomics.com (2016).

3.4. Statistics on FDI and Impact in Nine Industrial Sectors of GTP II

3.4.1. FDI in Ethiopia

There is a need to promote linkages with and spillovers from foreign investments to domestic firms. The Government has adopted policy focused on the development of the manufacturing sector through the use of industrial parks to attract FDI and to support SMEs. Accordingly, it would be beneficial for the investment agency to work actively with the investor community and seek out input providers and support services they require that could be provided by domestic SMEs. <Table 1-2> shows the selected technology and innovation indicators of a couple of countries for comparison of Global Competitiveness.

〈Table 1-2〉 Selected Technology and Innovation Indicators

GCI 2014–15, Key indicators under technology and innovation	Ethiopia		China		Turkey		Kenya		Rwanda		South Africa	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Availability of latest technologies	119	4.0	97	4.3	45	5.3	55	5.1	46	5.3	39	5.5
Firm-level technology absorption	128	3.8	68	4.7	37	5.2	56	4.8	49	5.0	29	5.4
FDI and TT	111	4.0	81	4.5	28	5.1	59	4.7	25	5.1	50	4.8

Source: World Economic Forum, the Global Competitiveness Report (2014–15).

Due to the subsistence nature of its economy, Ethiopia struggles to improve economic performance through enhancement of private domestic investment. Thus, FDI may be an important means to fuel growth.

<Table 1-3> summaries the licensed FDI projects by sector and status in Ethiopia from August 22, 1992 to November 23, 2016 G.C. Manufacturing, construction, especially in water well drilling, and agriculture are major sectors for the licensed FDI projects in Ethiopia.

<Table 1-4> summarizes the licensed FDI projects by year and status. [Figure 1-2] graphically shows the licensed FDI projects by year with Capital in '000' Birr. The peak of the licensed FDI projects in Ethiopia was reached in 2011 and decreased by year after the peak.

〈Table 1-3〉 Summary of Licensed FDI Projects by Sector and Status from August 22, 1992 to November 23, 2016 G.C

Sector	Total	Pre-Implementation	Implementation	Operation			
	No of Projs.	No of Projs.	No of Projs.	No of Projs.	Capital in '000' Birr	Perm Empl.	Temp Empl.
Agriculture	820	331	210	279	8,761,003	124,548	183,867
Manufacturing	2,431	799	503	1,129	63,257,810	119,402	59,613
Mining	26	6	5	15	452,043	633	194

〈Table 1-3〉 Continued

Sector	Total	Pre-Implementation	Implementation	Operation			
	No of Projs.	No of Projs.	No of Projs.	No of Projs.	Capital in '000' Birr	Perm Empl.	Temp Empl.
Electricity (Generation, Transmission, and Distribution)	4	3		1	1,000	10	5
Education	122	35	31	56	385,593	2,153	1,136
Health	106	15	36	55	468,114	1,741	372
Hotels (including Resort Hotels, Motels, and Lodges) and Restaurants	305	108	66	131	1,759,156	4,172	2,476
Tour Operation, Transport and Communication	133	43	25	65	227,710	781	490
Real estate, Machinery and Equipment Rental, and Consultancy Services	1,000	273	128	599	6,324,724	12,491	13,201
Construction Contracting including Water Well Drilling	401	135	103	163	11,282,976	20,193	39,904
Others*	90	14	20	56	696,397	1,574	5,453
Grand Total	5,438	1,762	1,127	2,549	93,616,526	287,698	306,711

* Export of Beverages, Cigarettes, Clothing, Copper, Gold, Gemstones, and Tantalum Concentrate; Import of Chemicals for Leather Industry through Bonded Warehouse System, Management of National Parks, etc.

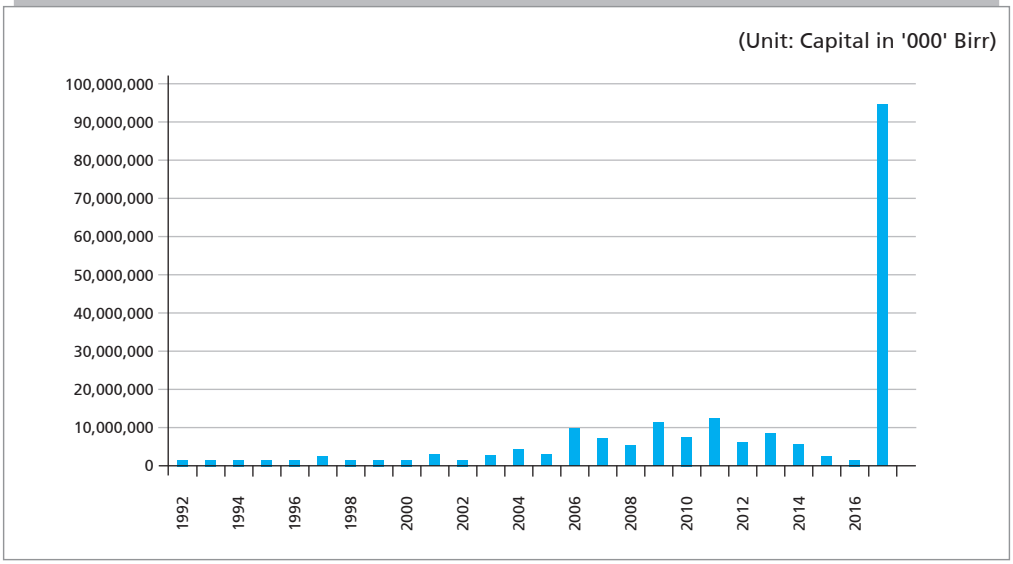
Source: Ethiopian Investment Agency, Annual Report (2016).

〈Table 1-4〉 Summary of Licensed FDI Projects by Year and Status from August 22, 1992 to November 23, 2016 G.C

Year	Total	Pre-Implementation	Implementation	Operation			
	No of Projs.	No of Projs.	No of Projs.	No of Projs.	Capital in '000' Birr	Perm Empl.	Temp Empl.
1992	3			3	153,876	693	0
1993	2			2	87,658	1,099	0
1994	3			3	309,399	2,356	0
1995	5	1	1	3	57,276	128	300
1996	19		2	17	406,451	2,283	255
1997	32	2	5	25	931,220	3,763	335
1998	24	2	7	15	870,014	1,580	3,016
1999	15		2	13	449,114	1,349	162
2000	27	2	3	22	923,517	4,591	2,278
2001	28		14	14	1,478,890	3,223	1,844
2002	22	1	1	20	530,099	1,814	1,577
2003	117	7	19	91	1,413,216	6,944	8,615
2004	222	22	37	163	3,585,777	9,733	19,522
2005	245	16	33	196	2,803,819	7,289	11,789
2006	296	31	55	210	10,465,209	17,915	17,930
2007	406	51	78	277	6,910,040	95,406	126,727
2008	470	53	119	298	6,153,243	33,285	38,689
2009	421	63	112	246	11,519,093	18,356	21,522
2010	425	55	183	187	7,822,862	10,212	12,487
2011	320	92	73	155	13,940,194	9,490	12,769
2012	605	341	72	192	6,908,495	8,179	4,763
2013	699	436	108	155	8,131,843	17,940	9,214
2014	349	151	87	111	5,738,117	12,973	6,091
2015	391	210	81	100	1,854,687	15,637	6,415
2016	292	226	35	31	172,417	1,460	411
Total	5,438	1,762	1,127	2,549	93,616,526	287,698	306,711

Source: Ethiopian Investment Agency, Annual Report (2016).

[Figure 1-2] Licensed FDI Projects by Year and Status



Source: Author's own contribution.

3.4.2. Sectoral Impact on Economy and Employment

The structure of the economy in Ethiopia can be categorized into three main economic sectors: agriculture, industry, and service. Contributions of sectors to economic growth in Ethiopia (1999-2013) are 35.2% in agriculture, 14.5 % in industry, and 50.2% in service, respectively, by MOFED data (2015).

Contributions of sectors to employment growth in Ethiopia (1999-2013) are 73% in agriculture, 11 % in industry, and 16% in service, respectively, by MOFED data (2015). While less than 15% is permanent employment in agriculture in job creation by job type.

Growth in the manufacturing sector by technology transfer turned out to be essential for sustained long-term economic growth and job creation, especially in Ethiopia.

3.5. Investment Incentives of Ethiopia

3.5.1. Fiscal Incentives

1) Customs duties exemption

To encourage the private investment and to promote the inflow of foreign

capital and technology in to Ethiopia, the following incentives are provided for both domestic and foreign investors engaged in new enterprises or expansion projects such as manufacturing, agriculture, agro-industries, construction contracting, etc.

a) 100% exemption from payments of customs duties and other taxes levied on imported goods is given to all granted capital goods, such as plant, machinery, equipment, and construction materials
b) Spare parts worth 15% of the total value of imported investment capital goods are exempted.
c) An investor with privilege of customs duty exemption is allowed duty free import of capital goods any time during the operational phase of his enterprise.
d) Investment capital goods imported without the payment of custom duties and other taxes on imports could be transferred to another investor as similar privileges.

2) Income tax exemption

If an investor is engaged in new manufacturing, agro processing, the production of agricultural products, and investment areas of information and communication technology (ICT) development:

a) If exporting 50% his products or services, or supplying 75% of his products or services as production or services input to an exporter he will be exempted from income tax for 5 years.
b) If exporting less than 50% of his products or services only to the domestic market, he will be exempted from income tax for 2 years.
c) If investing in priority areas such as textile and garments leather products agro processing, chemical and pharmaceutical, metal, and ICT to produce mainly export products, will be provided land necessary for their investment at a reduced lease rate.

3.5.2. Non-Fiscal Incentives

1) Investors who invest in production of export products will be allowed to import machinery and equipment necessary for their investment objects through their supplier's credit.
2) Investors who invest in agro industry and agriculture manufacturing will be eligible to obtain a loan of up to 70 % of their investment capital from Development Bank of Ethiopia, if investment feasibility is threatened.
3) The government will cover 30% of the cost of infrastructure (access to

road, water supply, electricity, telephone lines) for investors investing in the industrial zone development.

3.5.3. Indirect incentives

Perhaps the most powerful indirect incentive for TT that DCs could provide is to extend significant market access for products in which Ethiopia has a comparative advantage. TT and market access are closely linked to the market size and growth playing a role to attract trade and FDI, and the associated incentives are needed to invest in new technologies when the export markets are more confident.

3.6. SWOT Analysis for TT in Ethiopia

SWOT analysis for TT in Ethiopia was performed to find the strengths, weaknesses, opportunities, and threats Ethiopia faces. Reassurance of Strength, Opportunity, Weakness and Threat for TT as in <Table 1-5> could be a precursor to identify the internal and external factors involved in TT of Ethiopia.

〈Table 1-5〉 SWOT Analysis for Technology Transfer in Ethiopia

Strength	Opportunity
• Expansion of higher education • Government commitment on infrastructure development • Smooth partnership with other nations • Committed workforce • Double-digit economic growth for successive years	• Expanding infrastructure • Availability of labor work force • Availability of adoptable technology • Huge local market potential • Local and regional resource potential (coal, natural gas, crude oil, etc.) • Promising government infrastructure development effort and programs
Weakness	**Thereat**
• Lack of strategic focus • Inflexible to changes in policy formulation • Poor data control • Inadequate feasibility check before full-scale implementation of policy and strategy • Inadequate policy instruments to promote TT • Low level of institutional capacity	• Shortage of high-level skilled manpower for specialized areas • Limitation of good governance • Market computation and fluctuation • Inadequate finance, logistics supply, and services • Regional instability • Foreign currency shortage • Lack of technological dynamism

Source: Author's own contribution.

4. Korean Experience with Technology Transfer Policies

4.1. Technology Trajectory in Developing Countries

In order for late DCs to achieve economic growth, they should regulate, stabilize, and justify the market, and it is necessary to establish a "right" system in all three respects. Then there is the possibility of the right "policy" intervention to establish the right system. However, the role of technology is largely ignored in discussing the determinants of such long-term economic growth. Nevertheless, technological innovation is, in fact, the most serious obstacle for many countries, especially for middle-income countries in Latin America. Furthermore, it is unreasonable to expect that economic growth and leaps will naturally trigger with a stable macro environment, firm property rights, appropriate infrastructure, or free trade policies. There is still a question as to whether technology should be viewed as part of a system or policy, but new trends are emerging to look at economic growth focusing on technology.

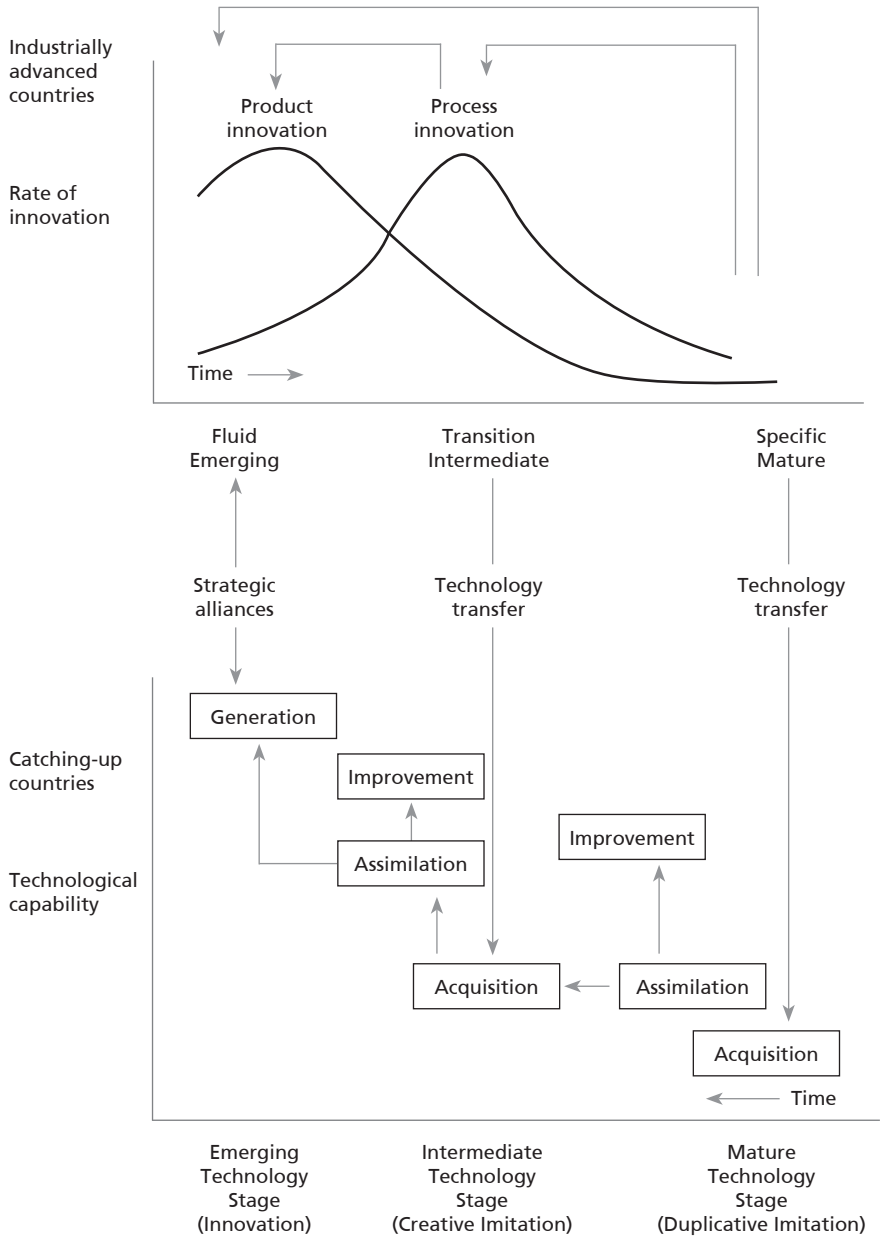
As globalization evolves, advanced nations concentrate on knowledge-intensive industry activities while transferring simple production functions to DCs. The international spatial reorganization of these industrial activities is dominated by multi-national corporations that can coordinate the functions linked across countries. By creating a global network of multi-national companies, regional bases specializing in R&D activities, skilled production, and simple assembly and production are emerging in each region of the world. Each of these regional bases is a regional cluster with specialized functions at the global level as its core competencies, but complementary peripheral functions are added at the regional level so that these core competencies can be fully exercised. Therefore, in a globalized economy, national competitiveness means gathering a lot of competitive regional clusters that can participate in the global international division of labor.

In DCs, where capital and technology are lacking, there is a shift from the primary industry, the agriculture-oriented economy, to the secondary industrial-oriented economy. Korea has been recognized as a representative case of successful industrialization in a short period of time and has entered the ranks of advanced countries, which makes it hard to find similarities around the world.

Researchers have classified the developing stages of late DCs as duplicative imitation, creative imitation, and innovative stages (Kim 1997a). The trajectory of technological development can be observed in the industrial sector of countries that have succeeded in developing into advanced countries, shown in [Figure 1-3]. In

the figure, the emerging technology stage belongs to innovation, the intermediate technology stage belongs to creative imitation, and the mature technology stage belongs to duplicative imitation.

[Figure 1-3] Technology Trajectories of Developed and Developing Countries



Source: Kim (2003).

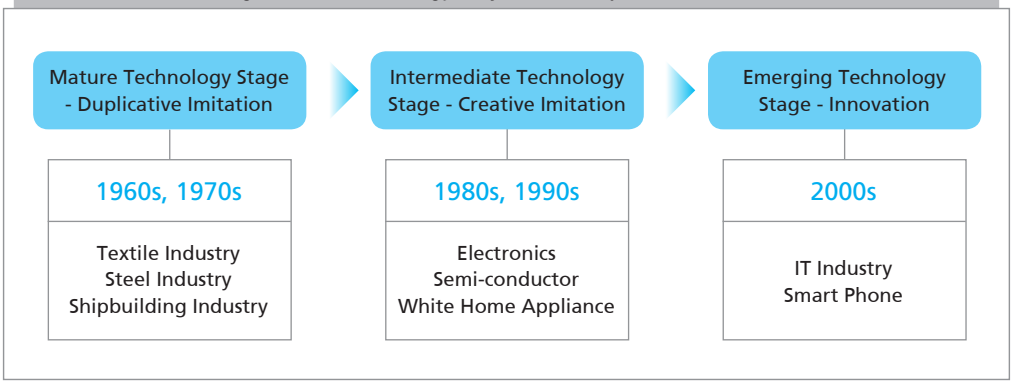
It is observed that the DCs that were going to follow the technology of the developed countries started from mature technology, which technically reached the limit in the advanced countries. In many DCs, the technology of aging in developed countries is introduced and localized. In fact, the electronics industry in Korea has evolved from the mature technology stage into a high-tech industrial stage with competitiveness through technology acquisition, technical assimilation, and improvement.

One may ask whether leapfrogging in industrialization is possible in the DCs. A study by the World Bank and another report indicate that countries that have failed to adopt old technology have a disadvantage when encountering new ones. In his book "The Third Wave," Elvin Toffler agrees that an agricultural society cannot evolve into an information age without going through an industrial age. This is because technology is not suddenly generated but is similar to life forms undergoing growth stages such as specific infancy, growth, and adulthood.

This is a noteworthy experience that shows that the priorities in introducing technology in the early industrialization period in DCs should not be the high-tech technologies, but the aging technologies that can be accommodated in the DCs autonomously.

Catching-up (developing) countries acquire the foreign mature technology and accumulate their own absorptive capability. [Figure 1-4] shows the technology trajectories observed in the early stage of industrialization in Korea. In the 1960s and 1970s, Korea started duplicative imitation from the mature technology stage depending on locally available capital, technology, and man power.

[Figure 1-4] Technology Trajectories Experienced in Korea



Source: Author's own contribution.

4.2. Technology Chasing in Korea

By explaining the process of technology chasing and the cases that occurred in Korea, we intend to provide DCs and their private enterprises some ideas and impetus to prepare appropriate countermeasures and incentivized measures to reduce or omit the time required for the transfer of technologies in order to reach the advanced technology stage.

To elaborate on the technology and market chase process, Lee and Lim (2001) presented the three categories of chase: path-following, step-abbreviated, and path-pioneering. Korea's experience showed cases of all three categories of chases during the industrialization period.

1) Path-following Chase

In this type, a latecomer company follows the path of the starter. In the path-following chase, the latecomer must go through the path in a shorter time than the first-tier company in order to eliminate the actual gap. The latecomers learn simple manipulation skills and skills related to the assembling process of products imported from foreign countries. They also learn the process technology while internalizing the products and the factory design provided by advanced companies. This step is basically a "duplicative imitation" stage.

2) Step-abbreviated Chase

The latecomer follows the path but skips certain steps to shorten the chasing time. Second-tier companies can imitate existing products or factories, while acquiring related technologies by externalization of the implicit design technologies possessed by overseas specialized R&D companies and manpower. This is considered as a "creative imitation" stage, somewhat different and better in design from the existing one.

3) Path-pioneering Chase

The latter company creates its own unique path in relation to technology development. This type of chase occurs when a latecomer initially follows the path of a leading company and changes to a new path. In the final phase of the innovation stage, the latecomer company creates a new product by using explicit knowledge at home and abroad to create a new product, realizing innovation through the chase. It acts as a leader in creating new technology.

Therefore, to know the technology level of a latecomer company, it is instructive

to identify what stage the company is in. For example, whether they are assembling products, producing parts, or designing products by themselves can be investigated.

The path-following or step-abbreviated chase is more likely to occur in a private enterprise led by an industry where the frequency of innovation is low and the target of pursuit is easy to set. On the other hand, path-pioneering chases are likely to arise from joint research and development between the government and the private sector in industries where technology is variable and the risk to large capital investment is high. What kind of government intervention could be most effective under these conditions will be a key issue in late emerging economies.

It is interesting to examine the basic pattern of knowledge acquisition in technology chases using the knowledge transformation process in four modes, of socialization, internalization, externalization, and combination, to understand the technology development stages as they took place in Korea.

4.2.1. Socialization Stage: Learning Production Techniques through Execution

The first step in technology chase is learning production techniques through practice. Trainees can learn operational skills and practice know-how while making the final product according to manuals usually attached to production machinery imported from foreign countries. This process results in an increase in productivity, which is an important source of chases at this stage. This step corresponds to the path-following chase. From the perspective of the type of knowledge transfer and creation, operational know-how and skill can be created or transferred based on local foreign technical leaders as well as operational manuals.

In 1968, Hyundai Motor Company agreed with Ford to construct a semi knock-down (SKD) production assembly plant in Korea. In 1970, Samsung opened a DRAM assembly factory in Korea, which is an example of socialization and internalization.

4.2.2. Internalization Stage: Learning of Process Technology based on Design

The second stage of knowledge creation is the learning of process technology through internalization. At this stage, the latecomer acquires the process technology while producing according to the design provided by the foreign companies. Acquisition of process technology means that latecomers will be responsible for production. In terms of knowledge creation, design is a form of documented knowledge that helps latecomers to establish a standardized final product, or a production facility to produce intermediate products.

Foreigners dispatch employees who can provide guidance in doing design, setting up production facilities, or producing goods. Operational know-how or skill learned in the previous steps will aid in knowledge learning in this second phase of acquiring production and process skills, but it is not decisive. This step is still regarded as a path-following chase in that it mimics the selection companies. The OECD (1996) has also stated that informal technology, which exists as information on the technology or embodied in human knowledge, has played a more important role in internalization of technology. This step is basically a "duplicative imitation" phase.

A representative example of this stage was that, in 1975, Hyundai succeeded in pursuing the imitation by developing “Pony” car based on a license agreement with Mitsubishi. Another case was that Samsung succeeded in skipping the step of producing 64K DRAM. After purchasing a 64K DRAM design from Microtronics, with the help of Japanese SMEs who had experience of establishing Sharp Electronics Factory, Samsung made the plant as it was. Samsung decided to begin production of 64 Kbit DRAMs, despite the government's advice to start with 1 Kbit DRAMs. That was the time when the global DRAM industry was moving from 16K to 64K.

4.2.3. Externalization Stage: Learning through Imitation Design of Existing Product

In the previous two stages, companies in developed countries provided product design and process design to latecomers. However, as the skills of latecomers improve, it is increasingly difficult to obtain or buy designs from start-up companies that are aware of the boomerang effect of TT. In this sense, this stage is a crisis for the chasing company (Kim, L., 1997a). Even if it is difficult to provide the design itself, latecomers can use the tacit knowledge that individual R&D companies, scientists, and engineers have individually using contracts, recruitment, and overseas R&D hubs. For example, when Japan refused to license one, Samsung's Silicon Valley R&D team developed a better 256K DRAM than those produced by Japanese companies (Kim, L., 1997b).

At this stage, externalization replicates the existing concept with the help of foreign tacit knowledge. However, this is what we call "imitation externalization" because it relies on R&D companies or individuals who have imitated existing product designs or concepts and have participated in major R&D projects. Sometimes, this creates better products than existing ones; thus, this stage is referred to as a “creative imitation” stage.

Mitsubishi, which had been providing Hyundai with older engine designs,

refused to relocate engine design technology and Hyundai had to develop its own "Alpha" engine from 1984 to 1992. This case is an example of step-abbreviated chase. When Hyundai started to develop the engine, an engine with a carburetor was widely available. However, Hyundai decided to develop an electronically controlled injection engine, knowing the trend of engine technology at the leading edge had shifted to the new electronically controlled injection system. With the success of this plan, Hyundai was able to reduce the technology gap in auto engines in a very short time.

4.2.4. Consolidation Stage: Learning through New Product Development

In the technology chase, the final stage of knowledge creation is a stage where not only the design of the existing product but also the product to mimic is not available. In other words, the latecomer has reached the final stage of the chase, to create an entirely new product based on a new concept. However, the latecomer still feels the need to access external knowledge bases to obtain critical core technologies. Rather than receiving TT from companies in the final stage of production as in the previous stage, these latecomers are now in a position to cooperate with leading foreign venture comers, which have technological capabilities but lack sufficient resources to carry out large R&D projects. They often become partners. At this stage, the first step is to combine the explicit knowledge of Korea and foreign countries. Foreign explicit knowledge is the core technology or source technology in foreign R&D partners or related documents.

This step is a genuine step in innovation and involves the creation of new technology development paths, or path-pioneering chase. First, the CDMA Development R&D consortium led by the Electronics and Telecommunication Research Institute (ETRI), a government research institute that had developed and commercialized the world's first CDMA wireless communication system, can be an example of path-pioneering chase (Lee and Lim, 2001). This is the result of joint development with Qualcomm, a US venture company. The second is the development of Samsung's 256M DRAM. The development of the 256M DRAM, with enormous R&D costs and risks, was driven by a joint public-private research effort. The third is the development of digital TV by Samsung and LG through the public–private R&D consortium in 1993.

Self R&D and Public - Private R&D

As growth progresses, latecomers reach the in-house self R&D stage, the earliest form of technology learning. In the 1980s, the maturation of the heavy chemical industry and the restructuring of high-tech industries were promoted. In addition, the importance of technology development through R&D became

more emphasized. In Korea, migration from in-license to self R&D can occur based on three opportunities (OECD, 1996). First, foreign companies were reluctant to provide core technologies. Second, from 1980, Korea had become less competitive and skilled labor force, and it had become more and more common in Korean companies to overcome this problem with their own technology. Third, government policies had also turned to supporting private R&D investment.

The ratio of private enterprise revenues to R&D was 0.5% in 1982, then reaching 1% in the mid-1980s and exceeding 2% in the early 1990s. Until 1970, private R&D was comparable to public R&D, but by the mid-1980, the size of public R&D exceeded public, then accounted for more than 80% of Korea's total R&D since the early 1990s (OECD, 1996).

However, for large or risky R&D projects or for projects requiring high levels of design skills, various forms of R&D consortium have served as an effective means of catching up on technology. The successful experience of the Public–Private R&D consortium in Korea, ranging from TDX, DRAM, and CDMA to digital TV, shows the positive role of government and government research institutes in the technology chase of latecomers.

Joint Development: Absorption Capacity and Complementary Assets

In the chase of technology, it is important to gain access to foreign knowledge in ways such as FL, FDI, or manpower scouts; however, the importance of properly commercializing these imported technologies cannot be overlooked. Additionally, in such commercialization, the absorption capacity of the latecomer is essential. In a poor absorption situation, if it is not feasible to obtain a license to use technology from a large-scale final producer, the latecomer can pursue a technology through foreign SMEs or R&D companies. In other words, as the cases of Hyundai Motor Company and Samsung Electronics suggest, it is possible to carry out necessary technology development projects in the form of a joint development contract with small and medium R&D companies in developed countries. In other words, if a large-scale manufacturer refuses to transfer technology, a second-tier company can get help from a professional R&D or venture company.

For example, the case of CDMA development in Korea suggests that the absorption capacity of Korean companies and government research institutes was important in domesticizing the external knowledge possessed by Qualcomm. The absorption capacity of such latecomers determines the detailed conditions of the TT contract and the performance of the technology access path.

Another success factor is securing complementary assets/competencies, which

is similar to absorption capacity but a different concept. Absorption capacity is important when the technology growth of the second-tier companies is relatively low. However, supplementary assets become more important once the supplementary assets reach maturity level of growth, and horizontal cooperation with foreign countries becomes possible. In the case of CDMA handset development, the cooperation between Qualcomm and the Korean consortium was possible because there was a need for both (Lee *et al.*, 2005). In other words, Korea needed Qualcomm's core technology and basic research skills, while Qualcomm needed R&D funding, commercialization capability, and technology backed by hardware facilities.

As the digital TV case suggests, despite the lack of sufficient competence and core knowledge base, Korean companies had certain complementary assets that foreign companies lack. For example, about 60% of the digital TV set production process was the same as that for analog TV, which was advantageous for Korean companies who had rich experience in analog TV production. In addition, the R&D sector of companies in advanced countries had to be supported not only by hardware, but also by a team of Korean companies with abundant technical and production experience.

The collaboration between General Instrument (GI) and Samsung was a result of GI's need for digital TV prototypes to be developed by partners—specifically, hardware for GI's R&D activities. Horizontal cooperation with companies in developed countries is possible only when the capabilities of second-tier companies are in a complementary relationship with those of the first-tier companies. In the past, TT through FL or FDI has emphasized absorptive power, but now complementary assets accumulated in rapid R&D activities and investments are emerging as a crucial factor in developing a new path of knowledge access.

Even though the type of intervention may be changed according to the period in which they occur, the government interventions still play an important role in technology catch-up in later countries (Amsden and Chu, 2003). Even in Taiwan, the fact that indigenous enterprises replace foreign companies at the end of the chase, eventually emerging as industry leaders, shows that corporate ownership is important in technology chase. From this point of view, it is very instructive to link the incentives on FDI with the localization rate of all the components constituting one product to strengthen the absorption capacity of indigenous companies.

In the case of CDMA development, Korean companies acquired licenses from venture firms, not industry leaders, and used technologies that were still in the process of being created. Compared with PCs and home appliances, in the case of CDMA development, Korean companies' position in this field of technology

was very stable because the contributions of Korean companies was crucial in commercializing foreign source technologies.

Though foreign companies have the means to provide early learning opportunities to latecomers, the technological development of latecomers cannot ultimately depend on foreign-invested companies. Technology chase is a prerequisite for conducting a variety of R&D activities, such as implementing projects, enhancing product production capacity, and developing applications and experiments. The accumulation of such capabilities and assets is impossible in foreign-owned enterprises and only in indigenous-owned enterprises. Because foreign companies have R&D capabilities in their home countries, there is no reason for foreign companies to improve their R&D capabilities. Taken together, it is important to R&D whether the company in question is foreign or indigenous.

4.3. Technology Access to External Knowledge in Korea

One of the most important features of latecomers is the lack of resources (Mathews, 2002). Knowledge is the most important resource among those that make up the enterprise, considering that technology chasing is an act of reducing knowledge gap with advanced countries. Therefore, the possibility of access to the existing knowledge base of advanced countries will determine the possibility of technology chase. This is because latecomers lack the ability to create their own knowledge.

The lack of technical knowledge and the ability to apply it to production depended on the import of package technologies such as turn-key contracts (KAIS, 1973). In the turn-key system by the introduction of the foreign technology in the 1960s, technicians had dedicated engineering design, equipment, and raw materials for factory construction and operation. In addition, FDI in free export zones has had very limited contribution to TT. This point should be recognized in case of FDI attraction for Ethiopia's industrial park.

Developed countries continue to create the majority of knowledge warehouses, and DCs are seeking access to these knowledge sources while being constrained by the limitations of the knowledge absorption path and the inability to absorb and apply new knowledge. The knowledge of developed countries plays an important role in resolving the economic gap, and the way in which the knowledge of each field is spread from developed countries to DCs plays an important role in technology chase.

As a result of quantitative research comparing the level of technological power

between developed countries and DCs through patent data, it is found that in DCs, achieving better technology catching and achieving relatively higher level of technical ability emerged in industrial fields where access to external knowledge is easy (Park and Lee, 2011). The case studies (Mu and Lee, 2005) show the importance of access to external knowledge base. Alternative paths to acquiring external knowledge include formal and informal learning, OEM, FL, FDI, strategic alliances, and joint development.

4.3.1. OEM and OBM Experience in Korea

In the early 1960s and 1970s, Korea was also active in the international division of labor with developed countries. Korea actively participated in the creation of international division of labor by exporting manufactured products to various developed countries such as clothing, shoes, and electronic products, or expanding OEM production with companies in developed countries.

Since this period was the initial stage of industrialization, the technology base of Korean companies was very weak and the size of the enterprises was generally small. Therefore, the exported products were manufactured by the OEM method of assembling foreign imported parts or processing the imported raw materials by using imported foreign equipment.

Obviously, in the early stage of industrialization of Korea, the quality management requirements and guidance of foreign buyers in production through OEM export contracts played an important role in learning foreign technology.

<Table 1-6> shows the technology developing process and production in industrial development experienced in Korea. As can be seen from the table, in Korea, where capital and technology were not available in the 1960s, 1970s, and 1980s during the industrialization stage of Korea, it was possible to establish a foundation on power for economic growth by introducing the turn-key plants from advanced countries and assembling production of finished products with imported parts. Most of the turn-key projects due to the introduction of foreign capital had very few opportunities for domestic technical manpower training, because technicians had dedicated engineering design, equipment, and raw materials for plant construction and operation. In addition, FDI in free export zones had a very limited contribution to TT. On the other hand, OEM production of competitive products for export made a significant contribution to reducing technology gap with developed countries in view of TT.

〈Table 1-6〉 Technology Developing Process and Production Pattern in Korea

Period	Base Formulation Period (1960s–Mid 1970s)	High-Growth Period (Mid 1970s–Mid 1980s)	Switch-Over Period (Mid 1980s–Late 1990s)	Re-Launch Period (After 1998–Present)
Growing Industry	Light Industry	Heavy-chemical Television Automobile	Electronics Steel Semi-conductor Industry	Advanced Industry (IT, BT, NT)
Developing Process	Establishment of Production Base: Imported Technology Dependence	Encouragement of Self-reliance : Import Substitute Part Production	Export Promotion : Plant Export, Learning Core Technology	Top-tier Technology Development and Product Export : World-class Creative Knowledge
Technology Import	Turn-key Plant Assembling Technology	Parts and Partial Technology Operation Skill	Material, Core, and Design Technologies with High Level	Self-Development of Core and New Technology
Production & R&D	Assembled Product with Imported Parts OEM Dominant No R&D	OEM/OBM : High Localization Part Rate	OEM/OBM : Product Innovation Process Innovation Active R&D	Self-Development of Technology : Global Novelty Leading R&D

Source: STEPI (1995) and Korean Intellectual Property Office (2007).

Even though most small scale companies had taken OEM, ODM, and OBM steps in sequence, the Korean conglomerates (chaebols) did not follow that path. They started their own brand business from the very beginning. In some respects, the Korean chaebols skipped the ODM stage in that they focused on final assembly while outsourcing most intermediate products. According to the OECD (1996), "Significant changes took place in the late 1980s. Many Korean export industries have switched to OBM production and have entered the global market with their own brand. Most of these products were low-priced, low-quality standardized products. Korean companies have recognized the importance of product differentiation and quality improvement long after they began exporting OBM."

However, Korean automakers' exports to the US market with their own brands faced extreme difficulties after the initial success of 1980, lacking clear design capabilities. Thus, since 1990, automobiles had to turn their major export markets to emerging economies such as Latin America, Eastern Europe, and Southeast Asia in order to secure time for quality improvement. In the 2000s, Korean automobiles achieved meaningful momentum in the US market. This shows how dangerous it

is to go directly into a brand strategy without having a strong design capability. Nevertheless, the dilemma was that sticking to OEMs could not be a long-term solution. The OEM experience of two other automobile companies (Daewoo and Kia) in 1980 shows that OEM exports do not automatically increase companies' business development and marketing capabilities (Guillen, 2001).

Building consumer loyalty and global brand awareness requires knowledge-based assets, or design capabilities, which are essential to developing products that can lead the market (Amsden and Chu, 2003). Therefore, latecomers must acquire design and product development capabilities. However, it is not easy to gain product differentiation and design ability for innovation, a dilemma for Korean companies. The Korean chaebols realized that advanced foreign companies were no longer trying to provide their own schematics, and that they faced a stage of crisis in the dynamic path of technology development.

In order to create a unique and long-lasting competitive advantage, we have to acquire design capability and realize that only then we can continue to receive orders from multinational companies. However, simply maintaining a domestic network or international subcontracting is not directly conducive to achieving design capability. The Korean chaebols overcame this crisis by cross-subsidizing huge R&D investments among their affiliates, and when that was not enough, a consortium was formed with the government.

Since the mid-1970s, the government's heavy chemical industry fostering had been an opportunity to expand technology demand. During that period, Korean companies invested heavily in foreign technology learning to secure market share in technology intensive industries. The exports were primarily OEM products, but as the technology accumulated, the number of products exported by the companies' own brands began to increase. For example, in the case of automobiles and televisions, the indigenous companies developed their own models and exported them to their own brands.

4.3.2. FL and FDI Experience in Korea

Unlike the strategy of aggressive liberalization of emerging industrial countries in East Asia, Korea continued its closure structure to foreign capital market until the 1997 foreign exchange crisis. As a result, FDI was not active in the early stage of industrialization in the 1960s. Introduction of debt types such as loan was mainly carried out because the government was reluctant to have domestic industry owned by foreign capital like FDI. Therefore, the dependence on FDI was low, as shown in <Table 1-7>.

〈Table 1-7〉 Formal TT Channel in Korea (1962–1981)

Year	FDI / Net Inflow of Foreign Capital
1961–1972	4%
1972–1976	11%

Source: National Records Archive, Korea.

Most DCs struggle to attract foreign technology and capital through FL and FDI in order to improve the economy, but in the early industrialization phase, Korea maintained a different position from other DCs. This provides a different policy direction to be considered in Ethiopia, which is mainly dependent on FDI. However, even though the proportion of FDI was low at the beginning of Korea's business growth, the country strategically provided competitive incentives at the time and attracted FDI. According to the data of 1978, more than 80% of FDI was invested in the manufacturing sector.

Even though FL and FDI demonstrate relative excellence in fostering TT, OEM played an important role in learning technology from advanced countries. However, the TT in the 1970s and 1980s was largely driven by the import of foreign technologies by way of licensing (OECD 1996). <Table 1-8 > shows the investment status in industrial sectors through FDI and FL, which are known to have been formal TT channels in Korea from 1962 to 1981. FDI in Korea was mainly concentrated in the synthetic fibers/resins and electrical machinery industries. Technical assistance and FL was a cost effective approach to acquiring the initial skills in the heavy-chemical industry in Korea. FL was mainly concentrated in the petrochemical and non-electric machinery industries, like metal and machinery sectors, since the late 1970s. This seems to be due to the fact that Korea has intentionally focused on industry in this field.

At that time, Korea was highly dependent on imported capital goods as a result of international comparisons (Westphal *et al.*, 1984). Capital investment in the export industry was dependent on the imported capital goods, and only labor-intensive sectors made domestic efforts in design and development of capital goods. The reason for industrialization without excessive dependence on the transfer of patented technology is that many industries initially introduced mature technologies such as plywood, textiles, and clothing. Large-scale chemical industry with continuous processes was exceptionally dependent on turnkey-type FDI and FL, as the foreign advanced companies avoided TT by other means.

〈Table 1-8〉 FDI and FL in Industrial Sectors in Korea (1962-1981); Percentage distribution of cumulative values by sector

Industrial Sectors	FDI		FL		Production
	Approvals granted	Amount invested	Approvals granted	Royalty payment	Value added
Food, Beverages, Tobacco	2.6	3.6	2.5	1.1	24
Textile, Apparel, Leather	9.7	7.2	1.6	1.1	19
Pulp, Paper Products	0.4	0.1	0.8	1.5	2.5
Pharmaceuticals	2	1.6	2.9	0.4	*
Synthetic Fibers / Resins	14.4	30.9	2.7	4.5	2.8
Petroleum Refining/ Chemicals	1.1	8.2	18.7	36.8	20.2
Cement, Ceramic Products	3.2	1.6	3	2.4	5.1
Basic Metals	9.1	6.7	9.7	11.4	7.1
Non-Electrical Machinery	17.2	8.9	31.6	21.3	2.3
Electrical Machinery	24.8	22.4	19.5	12.3	9.3
Transport Equipment	1	5	3	3.3	5.3
Other Manufacturing	14.4	3.9	4	3.7	2.3
Total Manufacturing	100	100	100	100	100

Source: Ministry of Finance; National Income Accounts, Westphal *et al.* (1984).

In the chase of technology, it is important to gain access to foreign knowledge in ways such as licensing, FDI, or manpower scouts. However, as license acquisition became more difficult and costs increased, the chase rate in this way slowed down or stopped entirely. In this situation, the importance of properly commercializing these imported technologies cannot be overlooked. In such commercialization approaches, the absorption capacity of the latecomer is very important.

The case of CDMA development in Korea suggests that the absorbency (domestic knowledge base) of Korean companies and government research institutes was important in domesticizing the external knowledge possessed by Qualcomm. The absorption capacity of such latecomers determines the detailed conditions of the TT contract and the performance of the technology access path. As mentioned above, in Ethiopia, the intensive attracting of FDI is one of the top priorities in the economic development planning policy. Important message will be delivered through examining the evaluation of the contribution of FDI to economic growth

based on Korea's experience.

Although FDI contributed greatly to the growth and industrialization of East Asian countries such as Korea at the beginning of industrialization, it was pointed out that hard-industry growth in East Asia was limited due to of the input of factors. Through the growth accounting analysis of scholars, it is argued that East Asian economic growth is factor-driven growth, relying on the capital and labor input.

This is based on that the economic growth rate in East Asian countries (1996~1990, 10.32% in Korea and 9.10% in Taiwan) having demonstrated remarkable performance, but the improvement of total factor productivity (TFP), which enables sustainable growth in the medium and long term, did not contribute much to economic growth in East Asia, as shown in <Table 1-9>. In the case of Korea, the contribution of capital and labor to economic growth depends on the input of factors. This is one of the approaches to correlate the accumulation of technology development capacity as a combined result of various economic, social, and technical input factors. Here, the fact that Korea's TFP growth rate is low means that the rate of technological progress of our economy is low.

Because Korean economic growth has been reliant on capital accumulation in the past, the growth rate has slowed and the return of capital has declined since the income level has risen, affecting the approach required to maintain growth. In other words, technological progress will play the most important role in determining economic growth, unlike in the past, which depended on capital accumulation. Therefore, in order to improve the long-term sustainable economic growth rate, it is necessary to focus on technological progress. In this respect, when discussing the effects of FDI on economic growth, the effect of domestic technological progress such as TT and technology diffusion could be a more important factor for economic growth than capital and labor.

〈Table 1-9〉 Analysis on Growth Factors in East Asia Countries (1966~1990)

	Economic Growth Rate	Contribution by Capital	Contribution by Labor	Growth Rate of TFP
Korea	10.32	46.2	42.2	11.6
Singapore	8.50	73.1	31.6	-4.7
Taiwan	9.10	40.5	39.8	19.8
Hon Kong	7.30	42.3	27.6	30.1

Source: STEPI (1995) and Korean Intellectual Property Office (2007).

In the turn-key systems that came with the introduction of the foreign technology in the 1960s, technicians had dedicated engineering design, equipment, and raw materials for factory construction and operation. In that sense FDI in export-free areas has limited access to disseminate the relevant technology.

Turn-key system introduction of foreign technology was done by the package type of FDI oriented in wholly owned or majority-owned subsidiaries, which may have thus had little impact on the application and diffusion of Korean industries. Other formal TT inflows were attempted in various ways beyond the package-type wholly-owned or majority-owned subsidiary FDI (Robinson, 1988); Equity joint venture, Contractual joint venture, Partnership or Strategic alliance, pure contract (licensing, technical assistance).

In addition, efforts had been made to strengthen the absorption capacity and to improve the technology level of indigenous enterprises supplying parts by specifying the localization rate of the parts to product or system in the foreign capital investment and the joint venture.

In 1967, Hyundai Motor Company started out as a joint venture with Ford of America. Because Hyundai had no technology, it was actually engaged in assembly and production (i.e., Semi Knock Down) of Ford's vehicles. Ford's headquarters in the United States appointed Hyundai Motor Company and Ford UK subsidiaries as partners. The Cortina (1598cc displacement), 20M (1985cc medium car), D-750 truck, and bus were selected as the first assembly models. In May 1968, Hyundai started to construct a plant capable of producing 3,500 units on 660,000 ㎡ of land in Ulsan. The Korean Automobile Industry Protection Act, enacted in 1962, stipulated that more than 21% of parts of automobiles should be covered by domestic production. Accordingly, Hyundai appointed over 50 producers in Korea, including battery, electric wire, cooling system components, spring, glass, and sheet, through coordination with Ford.

In 1973, the foreign investment legislation was amended to encourage more joint ventures instead of direct investment. However, there was also a risk of excessive dependence on foreign technology institutes in the case of joint ventures. Here, it should be reminded that the benefits of obtaining the skills and productivity improvements needed for economic growth from FDI are not significant in countries with low income levels. In order to be able to receive technology from multi-national companies, the technology level of the host country should be above a certain level. This point should be considered in FDI policy for TT in DCs like Ethiopia.

On the other hand, there has been much skepticism about the role of FDI

as a technology learning path. In this regard, the contrasting cases of Hyundai Motor and Daewoo Motors are introduced (Kim, L., 1997a). Hyundai did not share management rights with any foreign shareholders, including Mitsubishi, keeping initiative of core R&D projects such as engine development independently. Hyundai's technology developments with help by specialized R&D companies, such as Ricardo, progressed steadily. Conversely, Daewoo shared ownership and management rights with GM, but GM was reluctant to relocate key technologies to treatment. As a result, Daewoo separated from GM in the early 1990s and became independent. Daewoo then began to bear fruits of its own R &D investment from the mid-1990s. These examples show that the securing of indigenous enterprises, which can undertake their own technological development with ownership of companies rather than being dependent on foreign capital in DCs, is the most important factor for sustainable technology development in the long run.

This experience suggests that it is not easy to achieve a step-abbreviated or path-pioneering chase if you just follow the FDI strategy from start to finish. However, attracting many foreign-invested companies in the country provides opportunities for technology learning and imitation for neighboring late-indigenous companies. Such skepticism about the role of FDI or international subcontracting does not necessarily mean that latecomer countries should not seek to attract foreign firms. Many Korean conglomerates have continuously made FDI or OEM relationships with foreign multinational companies and thereby facilitated learning.

It can be said that investment-induced companies can introduce foreign technology relatively easily compared to pure domestic ones and, thus, contribute to enhancement of technology. The technology introduced by foreign companies has a positive effect on technological progress of domestic companies, and this technological progress has an effect on the improvement of the production management of the introduction enterprise, having a positive effect on the domestic economic structure. According to the Korea Development Bank, about 31% of foreign-invested firms in Korea have experienced the introduction of new technology for the first time in Korea, indicating that foreign-invested companies have played an important role as a means of introducing overseas technology.

According to the Korea Development Bank, 65% of the technologies introduced in Korea were imitated and used by Korean companies within a relatively short period of 3 years, and their technologies were spread to the domestic technology market relatively rapidly. From a dynamic point of view, if the technology is spread to the relevant industries and related industries, and the productivity of the domestic companies is enhanced, it will also have an effect of inducing domestic investment. Therefore, in Ethiopia, it is necessary to develop and execute the incentivized measures that promote these types of technology spillover induced by FDI.

In general, foreign-invested enterprises perform R&D mainly in the parent company and thus do little core research in the host countries. For example, US manufacturing multinationals do 80% of their R&D work in their home countries. If this is reversed, it would be very effective for the government to support development funding to the domestic companies based on the clear support criteria for the development of parts or finished products related to exports or imports. The rational support criterion is based on the localization rate.

4.3.3. Reverse Engineering Experience in Korea

After the Korean War, Korea started industrialization as the world's poorest country, with poor natural resources and poor national capital and with almost no industrial base such as facilities, technology, and human capital. Under these constraints, human resources were seen as an effective tool to develop the country at the beginning stage of industrialization. As a result, absorptive capability building turned out to be an important asset for technology development.

Korea has become the world's most notable example of success in transition from a DC to a developed country in the shortest time. Some of the characteristics of Korea's early industrialization are as follows:

- Human assets became an effective tool that contributed not only to individuals but also to the development of the nation. Cultivation of skills to absorb technology through education and training was an important form of capital.
- Effective use of export-driven and import-substitution policies by the Korean government made it possible to acquire skills quickly in the market.
- Reverse engineering has played a decisive role in securing localization of technology and export competitiveness of production commodities.

A more detailed look at the reverse engineering process, which has been acknowledged to be the most important contribution to TT in Korea, is in line with the three-step process of technological development previously mentioned:

1) Technology acquisition: This refers to acquisition of technology through importing. Domestic manufacturers acquire technical data in printed form such as product catalogs, design drawings, technical reports, and part information from foreign countries.
2) Technology assimilation: This refers to an accumulation of know-how through localization. The technical data and imported product information acquired by the domestic manufacturers have been localized into the product technology through a repetitive imitation production process, achieved by disassembling the component parts of the imported product and copying and

producing autonomously, and accumulating own know-how of production technology.

3) Technology improvement: This refers to enhancement of technology by local makers. Domestic manufacturers have established a production process that can be used in the domestic market through the localization of production technology by simulating technology development. Based on the information on the advanced production products, this will improve the existing production technology and parts. This improvement has reached the stage of production of commercial products through skilled management and manpower.

In Korea in the 1960s and 1970s, the three steps of technological development were integrated. Through continuous education and training, it became possible to acquire skilled technical manpower. In addition, based on a cheap and excellent work force, Korea successfully localized mature technologies and products under the barren conditions in DCs.

Since 1965, the rate of industrialization had begun to speed up in Korea due to the increase in manufacturing exports and domestic demand. Economic growth in the period 1965–1981 averaged 11%, double the rate of the 1955–65 period. In the mid-1970s a new turning point came about in this process. Until this time, Korea focused mainly on the enhancement of productivity, but afterward prioritized the influx of foreign capital and showed less interest in domestic investment capability. FDI contributed to productivity enhancement for export, but contribution to TT was weak (Westphal, Kim, Dahlman, 1984). In Korea, FDI mainly contributed to technology development in the chemical industry.

Through the government-led export-driven policy and import-substitution policy in 60s and 70s, manufacturers established rapid imitation production technology by "learn by doing". Reverse engineering process of mature technology as an imitative way of learning successfully marketed the domestic products and allowed companies to engage in export, even in the low technology market. In the 1980s and 1990s, Korea evolved into the intermediate technology stage through aggressive efforts to build up its own technological capabilities, where creative imitation could be done between developed countries and DCs.

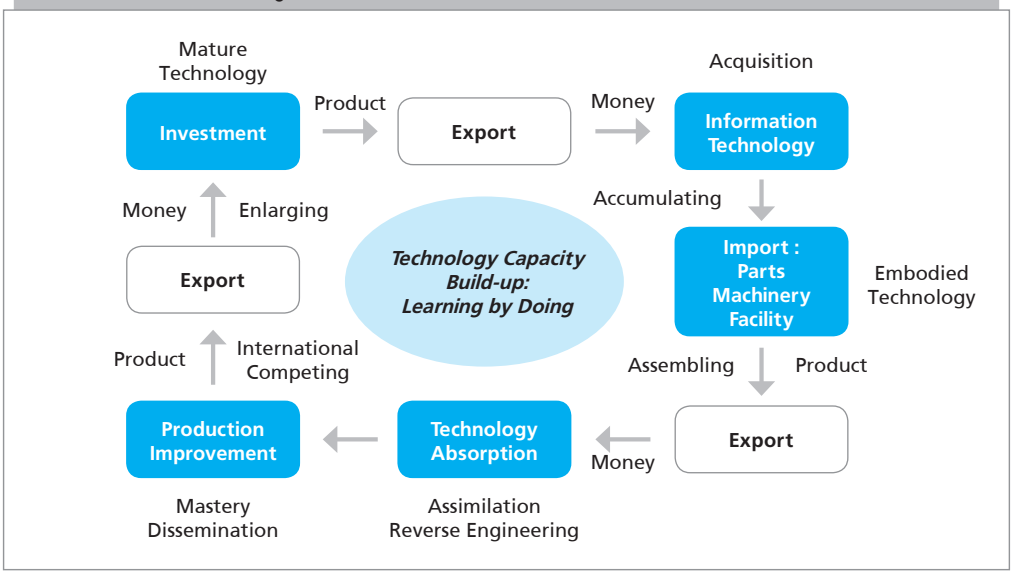
Many studies in more than ten different industrial sectors in Korea indicated that informal transfer mechanisms such as reverse engineering and technology spillovers have played a tremendously important role in strengthening Korea's competiveness in the international market.

[Figure 1-5] shows that reverse engineering was a key vehicle in completing

the virtuous cycle of TT by cultivating technical absorption capacity with "learn by doing" at the beginning of industrialization in Korea. Lacking capital and technology, Korea invested foreign capital, introduced mature technology of developed countries, made and exported products, and started on the path to industrialization. Korea acquired money and the information through export activities, making the assembled products by introducing the manufacturing facilities and parts imported, and exporting them again. Korea reinvested the capital, improved the product manufacturing technology by reverse engineering, exported it again, and thereby completed the virtuous cycle structure of TT. The technology acquisition was accumulated and cultivated as absorption capacity through the operation, assembling, and production process of embodied technology in parts, products, and facilities.

At that time, Korea's national aspiration to overcome poverty through competitive growth had a very positive effect on the motivation of technology learning, and Korea was in a favorable position to acquire skills from foreign countries through learning to increase the assets of domestic human resources. The rate of overseas education in tertiary education, and with it the number of scientists and engineers, increased rapidly, favoring the ability to cope with technical skills in imitation and acceptance of technology. At this time, an important technology sources were product buyers and equipment and raw material suppliers. In particular, product design technology was highly dependent on export buyers. The next important source was the relocation of the labor force who had worked in overseas factories and the return of overseas students.

[Figure 1-5] Virtuous Circle of TT Observed in Korea



Source: Author's own contribution.

As mentioned above, FDI and FL played a limited role in TT in Korea. In a small number of sectors such as electronics, it was dependent on the form of multi-national corporations, or other forms of international contracts. In most industrial sectors, the notable technological developments were informal TT of information obtained from imitation, apprenticeship, and export. This means that the spillover effect of TT from foreign-invested firms to domestic firms was considerable.

The path of technology propagation shows various effects, such as the front-to-back association effect, external effect, exhibition effect, and technical manpower training. It is generally held that there were three types of technology spillover:

- Demonstration effects occur when local firms acquire knowledge or technology from foreign firms through imitation or reverse engineering.
- Labor turnover occurs when former transnational corporation (TNC) employees are employed by local enterprises or establish their own firms—that is, through the physical movement of people in the local economy.
- Vertical Linkages occur when local firms are engaged in the TNC value chain, as suppliers. The requirement of meeting the necessary technical specifications and quality standards means that these local firms frequently need to improve their products and services, including through adopting improved technology and enhanced practices. Vertical linkages can also be from foreign suppliers to domestic buyers (forward linkages), whereby local capacities and competencies are developed to handle a technological advance.

4.4. Incentivized Measures in Policy for TT Promotion in Korea

Most DCs are interested in the incentive policy to promote FDI, while in this paper the scope of the incentive is extended to include diverse policies in all areas with an incentivized nature to speed up and facilitate the TT activities. Extension to diverse policies includes:

- Incentives encouraging investment
- Reduced risk (fixed tariffs, stable exchange rate, guarantees, etc.)
- Increased information exchange
- Alignment of actor interests in market chain
- Clear, consistent, long term market signals
- Entrepreneurship and education
- Integrated planning

Incentives in general are an effective measure to attract FDI; at the same time, there is also a question as to whether incentives are the best policy for attraction of

investment in DCs. It is generally known that incentives used in DCs work in business with large-scale investment by accelerating depreciation for the fixed assets, cash supporting incentives, and land price aid or real-estate-supporting incentives.

On the other hand, business environments are more important in small-scale investments, which mostly happen in DCs. This means that business environment factors, such as business constraints, market size, and labor potential, are more attractive than the specific incentives in the DC.

According to the multilateral nature of TT and incentives, a comprehensive investigation of these problems experienced in Korea is needed on government policies and analysis in the early stage of industrialization. Most of the DCs in the early industrialization prioritized the policies of localizing the imported products in order to promote national development through the technology independence, to enhance the self-sustaining power of the domestic industry and to improve the trade balance.

However, Korea attempted a completely different industrialization strategy in the 1960s in the early stage of industrialization. This unique industrialization strategy was the open-door foreign strategy implemented by means of the export-driven policy. The weak point of this strategy is that it may increase foreign dependence of the economy. Nevertheless, this strategy has more positive points, such as overcoming shortages and limitations in market, finance, and technology. Other positive points are specialization of target industrial sectors and their acceleration of export, absorption of late-onset benefit with enlarged foreign contact, and economic merit with scale depending on foreign market.

Even though Korea started industrialization with an export-driven policy and implementation following strong government planning, Korea experienced a lot of failure due to lack of experience and patience:

- Finance expansion and bank interest rates lowered to mobilize the domestic fund (1961, 1962): failed
- Datsun auto localization plan (1962): failed (1963.3)
- TV set localization plan by foreign loan: dropped (1962.7)
- Introduction of short term commercial foreign loan: rapid decrease in foreign exchange reserves—16.7 million dollars (1962)—due to return of principal and interest

However, with the lessons of this experience of failure, Korea was able to correct the implementation process of the policy (Table 1-10). Korea's experience of "learn by doing" in the early stages of industrialization was very valuable.

〈Table 1-10〉 Enforcement of Implementation to Recover Policy Failure in Early Period of Industrialization, 1960s

Year	Implementation
1961	Direct export encourage subsidy, general bank and tax policy
1963	Extensive export-import linkage policy
1964	Sharp devaluation of foreign exchange rate
	Reform to unitary floating exchange rate system
	130 won/dollar → 255 won/dollar

Source: Sang-Chul Lee (2004).

4.4.1. Interplay between Export and Import Policies and Incentives

Unique to Korea's technology development is the speed and effectiveness of technology acquisition and the interaction between technology development and trade policy. Korea executed various comprehensive and incentivizing measures in accordance with its strategic policies in order to strengthen policy implementation following the national industrialization strategies in the 1960s and 1970s. In the 1960s, Korea applied the direct export support systems and the automatic export incentive systems as export-driven policy. In later stage of industrialization in the 1970s, Korea tried to set up a self-supporting economy by import-substitution policy and support focusing on the heavy-chemical industry.

Export-driven policy oriented toward light industry in the 1960s can be divided into two categories based on the early and later stages of the 1960s. Direct export support system was performed in early stage of 1960s such as export subsidy and export-import linkage. Export-import linkage means that import rights could transfer to exporters to use as amount of total export financing, entailing an import right premium in the market. The automatic export incentive system was performed in the later stage of the 1960s, such as automatic affirmative action for export financing and automatic reduction in tax (or full elimination of tax) for imported intermediate products for production of export commodities.

Import-substitution policy centered on the heavy-chemical industry in 1970s can be divided into two categories based on the early and later stages of the 1970s. The promotion system was used in the early stage of the 1970s, such as enactment of promotion laws on heavy-chemical industries (1970) and provision of business environments and incentives. The funding system was used in the later stage of 1970s, such as enactment of national industrial fund laws (1974) and supply loans with long-term and low-interest.

The Korean government's more active export-oriented policy was in 1964-65. First, the exchange rate was devalued. In the exchange rate reform announced in May 1964, the existing multiple exchange rate system was converted into a single floating exchange rate system and the base rate almost doubled. As can be seen in <Table 1-11>, the exchange rate rose to 280 won/dollar after the single floating foreign exchange rate system was implemented in March 1965, but remained at the level of 270 won/dollar until 1967 due to the intervention of the Bank of Korea. In fact, Korea's real exchange rate and real effective exchange rate, when the average value of 1970–2006 was taken as 100, were mostly between 80 and 120, excluding the foreign exchange crisis period. This is similar to the US's real effective exchange rate. <Table 1-11> shows that the Korean government has successfully managed to maintain the exchange rate in a stable manner at a level comparatively close to the market price.

〈Table 1-11〉 Incentive Advantage on Export and Import by Foreign Exchange Rate Control in Korea (1960–1974)

(Unit: won/dollar)

Year	Official Rate	Export Incentive		Import Supplement		Effective Exchange Rate		Real Effective Exchange Rate	
		Premium	Support	Foreign exchange tax	Tariff	Export	Import	Export	Import
	a	b	c	d	e	a+b+c	a+d+e		
1960	62.5	83.9	1.2	22.7	15	147.6	100.2	319.6	216.9
1961	127.5	14.6	8.5	2.7	16.8	150.6	147	289.1	282.2
1962	130.0	-	21.5	0.2	16.2	151.5	146.4	264	255.1
1963	130.0	39.8	19.6	6.2	12	189.4	148.1	275.8	215.7
1964	214.3	39.7	27.4	11.7	21	281.4	247	305	267.6
1965	265.4	-	39.2	-	27.7	304.6	293.1	340.6	293.1
1966	271.3	-	51.6	-	25.1	322.9	296.4	305.1	280
1967	270.7	-	62.4	-	25.5	333.1	296.2	299.1	266
1968	276.6	-	77.7	-	25.9	354.3	302.5	298.8	255.1
1969	288.2	-	75.1	-	24.5	363.3	312.7	295.6	254.5
1970	310.7	-	88.1	-	25.7	398.8	336.4	308.3	260.1
1971	347.7	-	103	-	21.8	450.7	369.5	325	266.1
1972	391.8	-	90.9	-	23.4	482.7	415.2	313.3	269.3
1973	398.3	-	91.6	-	19.4	489.9	417.7	339.5	289.4
1974	407.0	-	111.7	-	17	518.7	424	316.9	258.9

Source: Nak Nyeon Kim (1999).

It is meaningful to look at cases of actual export support by providing incentives through tariffs as a policy to protect domestic products and promote exports in Korea during the initial industrialization process. An important policy framework for Korea's export, import, and import substitution had reached a stage of stabilization by 1967. Therefore, it is instructive to examine the impact of the incentive support policies that Korea intentionally applied, which appeared in the 1968 data. <Table 1-12> summarizes the effective rate of protection (ERP) used in economics based on rearranged data analyzed by Westphal and Kim in the work of Krueger (1982).

〈Table 1-12〉 Selective Tariffs, Real Protection and Real Subsidy in Export and Domestic Market in Korea (1968)

(Unit: % of international value added)

Industry	Classification	Tariff	Nominal Protection	Effective Protection		Effective Subsidy	
				Exports	Domestic Markets	Exports	Domestic Markets
Rice	NIC	23.4	13.3	-0.3	14.5	2.6	19.2
Fishing	NIC	29.9	0	1.8	-4.2	11	1
Refined sugar	NIC	38.8	0	-0.3	-38	3.9	-43.6
Cement	NIC	13.3	2.8	-3.7	-12.8	5.3	-11.7
Lumber	NIC	25.7	0	19	-18.5	14.3	-26.3
Plywood	X	10.2	0	30.9	-28.4	41.8	-35.9
Synthetic resins and fibers	IC	40.6	24.1	-0.4	37.1	19.1	49.9
Petroleum products	NIC	38.3	-24.9	1	1.6	3	2.4
Cotton fabrics	X	73.6	23.4	-8.7	169.5	93.8	176.2
Tires and tubes	NIC	93.9	0	1.2	-44.3	-14	-57.2
Fertilizer	IC	0	4.8	-6.3	-2.9	35.1	29
Tools and other metal products	XIC	36.2	27.1	-4.3	57.8	4.4	55
Steel sheets and bars	IC	24.4	27.8	-7.5	138.7	15	-3186.6
Knit Products	X	61.3	11.7	-2.4	31	2.3	14
Leather shoes	X	89.9	6.7	-1.7	-3	5.2	-9.9
Pottery	IC	76.4	49.6	-2.5	97.3	52.3	96.3
Electric components	XIC	1.6	1.6	-2.1	39.2	6.3	49.6

〈Table 1-12〉 Continued

(Unit: % of international value added)

Industry	Classification	Tariff	Nominal Protection	Effective Protection		Effective Subsidy	
				Exports	Domestic Markets	Exports	Domestic Markets
Metal working machinery	IC	20.9	4.5	-3.3	-10.6	-5.3	-14.7
Office Machines	XIC	70.4	24.2	-4.1	34.2	7.3	31.9
Electronic equipment	IC	51.7	44.6	-5.8	64.5	0.7	48.1
Motor vehicles	IC	121.5	88	-13.5	247.7	-6.1	241.8

Notes: NIC = Non-import competing industry
IC = Import competing industry
X = Export industry
Source: Krueger (1982).

4.4.2. Enactment of Industry Promotion Laws

The Korea government intensively enacted laws to promote six selected industries (1967–1970), as shown in <Table 1-13>. Through these promotion laws, Korea could strategically provide comprehensive measures and incentives by focusing on specific industries. The enactment of intensive promotion laws for these specific industries was a very unusual and efficient measure that was hard to find in other DCs. This experience in Korea demonstrates the importance of proper national intervention in the early stages of industrialization of DCs to support the technology improvement in the selected industries.

The main contents of the industry promotion laws were:

- Establishment of promotion plan
- Forming of government fund for long-term and low-interest-rate loans to the six industries
- Establishment of promotional association and pass regulations
- Preferred incentives to protect industry

〈Table 1-13〉 Enactment of Promotion Laws by Korea

Promotion Laws	Enacted
Law on Machinery Industry Promotion	March 30, 1967
Law on Shipbuilding Industry Promotion	March 30, 1967
Law on Electronics Industry Promotion	March 30, 1967
Law on Steel Industry Promotion	January 1, 1970
Law on Petrochemical Industry Promotion	January 1, 1970
Law on Non-Iron Steel Refining	January 22, 1970

Source: KDI, "2014/15 Knowledge Sharing Program with Ethiopia"(2015).

4.4.3. Establishment of Government-Funded Institution

As Korea's industrialization progressed, Korea started to make government-funded research institutes intensively supported by the government in order to increase private technology development in the backward industry. For the first time in 1966, Korea established its symbolic national research institute, the Korea Institute of Science and Technology (KIST), which modeled Bell Labs in the United States. KIST strategically attracted the advanced engineers who settled in foreign countries after receiving a degree from abroad. The Ministry of Science and Technology (MOST) was established to support and control the nation's science and technology in 1967 for the first time as a government ministry in the DCs. In 1971, the Korea Development Institute (KDI) was established to perform high-level research on establishing and consulting national development policy for the government.

In 1973, Korea enacted the Law on "Support of Specific Research Institutes" to promote research and development in specific industry sectors. Based on the law, 16 government-funded institutes were established in turn, including:

- Korea Atomic Energy Research Institute (KAERI) (1973)
- Korea Research Institute of Standards (KRIS) (1975)
- Korea Research Institute of Chemical Technology (KRICT) (1976)
- Electronics Technology Research Institute (ETRI) (1976)
- Korea Electronics and Telecommunication Research Institute (1976)
- Korea Institute of Energy Research (KIER) (1977)
- Korea Institute of Machinery and Materials (KIMM) (1981)

4.4.4. National Investment Fund Making

The Korean government tried to promote the heavy-chemical industries to

substitute the imported intermediate goods. At that time, the Korean government faced financial difficulty due to the lack of financial resources. Thus, the government decided to introduce FL rather than attract foreign capital in order to support the heavy-chemical industry, and succeeded in making national funds for support based on domestic capital.

The National Investment Fund (NIF) was one of most noticeable policy implementations for industrialization in the developing era of Korea. The NIF was designed to be secured with deposits from commercial banks, insurance companies, and government funds. Contributions to the fund comprised 74% by commercial banks, 14% by insurers and 12% by other government funds (1974–1993). In 1974, the Korean government enacted the NIF Law, which mobilized all national resources. Despite severe budget constraints, the finance ministry could provide long-term loans at low interest rates to the heavy-chemical industries.

Through NIF, the Korean government laid the foundation for strategic financial support to the domestic companies through such loans, as shown in <Table 1-14>. NIF really played a meaningful role in securing investment in the heavy-chemical industries for two decades. As shown in <Table 1-15>, the investment funds raised were steadily invested, from 59% to 78% during 1955–1980 in the domestic manufacturing industry and the construction of social infrastructure. According to the national manufacturing-oriented industrialization policy during this period, the ratio of loans to manufacturing in total lending steadily increased from 44% to 56%. One can realize that lending moves to heavy industry from light industry after 1980 due to the government's policy nurturing the heavy-chemical industry.

〈Table 1-14〉 Bank Loan, Foreign Loan, Interest, Inflation Rate in Korea (1960-1975)

Year	Loan (10 Billion Won)				Interest (%)					Wholesale Inflation Rate (%)
	Deposit Bank	Export Finance	Industrial Bank	Bank Guarantee	Deposit Bank Loan	Export Finance	Industrial Bank Loan	Commer-cial Loan	Private Loan	
1960	24.3	1.4	15.9	0.6	13.9	13.9		5.3		10.7
1961	32	0.8	20.3	1.6	13.3	13.9		5.3		13.2
1962	43.2	1.6	24.3	5	13.4	9.1	8.4	5.6		9.4
1963	49.1	2.7	27.6	21.8	13.1	8	8.3	5.6	52.6	20.6
1964	53.1	2.5	31.7	48.2	13.3	8	8.4	5.3	61.8	34.6
1965	72.1	4.6	36.8	75.3	16.2	6.5	9.2	5.5	58.9	10
1966	102.7	4.9	46.6	144.7	21.4	6.5	11.8	5.5	58.7	8.9
1967	178	16.7	52.4	291.6	21.8	6	12.5	5.8	56.5	6.4

〈Table 1-14〉 Continued

Year	Loan (10 Billion Won)				Interest (%)					Wholesale Inflation Rate (%)
	Deposit Bank	Export Finance	Industrial Bank	Bank Guarantee	Deposit Bank Loan	Export Finance	Industrial Bank Loan	Commer-cial Loan	Private Loan	
1968	331.2	24.5	66.4	523.7	21.5	6	12.7	5.9	56	8.1
1969	563	35.1	96.1	865	20.7	6	12.2	6.1	51.4	6.8
1970	722.4	55.9	129	1,198.5	17.6	6	12.5	6.5	50.2	9.2
1971	919.5	80.1	157.5	1,599.9	16.4	6	12.4	6.6	46.4	8.6
1972	1,198	108.4	239.1	1,695.5	17.7	6	9.9	6.6	39	14
1973	1,587.5	221.6	318.5	2,151.0	13.9	6	9.7	7.5	33.2	6.9
1974	2,427.8	359.5	425.7	3,163.1	14	9	9.7	8.2	40.6	42.1
1975	2,905.5	338.9	577.8	4,198.8	13.6	7	11.2	7.3	47.9	26.5

Source: Nak Nyeon Kim (1999).

〈Table 1-15〉 Loan of Deposit Bank and Industrial Bank for Industrial Sector (1955-1980)

Industrial Sector	1955	1960	1965	1970	1975	1980
Agriculture, Fishery	25.8	30.6	18.8	12.4	9.2	7.1
Mining	4.9	4.3	2.8	2.4	1.6	1
Manufacturing	44.3	42.1	45.7	47.5	56.2	55.8
Light industry	26.9	18.7	21.5	21.6	27.9	19.6
Heavy-chemical industry	17.4	23.4	24.2	25.9	28.3	36.2
Social Overhead Capital	14.5	12.3	16.8	16.4	20.3	22
Construction	1.7	5.9	3.8	7.8	8.2	10.5
Electricity, Water	9.8	4.2	10.8	5.3	6.5	4.7
Transportation, Warehouse, Telecommunication	3.2	2.1	2.2	3.3	5.6	6.8
Service etc.	10.5	10.7	15.9	21.3	12.7	14.1
Total Industry (%)	100	100	100	100	100	100
Total Industry (billion won)	66	402	1,038	8,111	33,294	147,609
Loan / Product (%)						
Light industry	17	30	23.1	51.4	68.3	
Heavy-chemical industry	40.5	109.9	53.2	96.7	76.7	
Loan / Export (%)						
Light industry			92.6	97.4	65.8	50.7
Heavy-chemical industry			394.1	632.0	153.5	111.6

Source: Korea Trade Association Annual Statistics, David C. Cole and Yung Chul Park (1984).

Foreign capital attraction policy:

In the first stage of industrialization in Korea (1962–1983), the government worried about the dominance of foreign companies in domestic companies. Therefore, Korea sought to attract foreign loans first, rather than the FDI. This step is called the investment restraining stage.

The second stage (1984–1989), when industrialization was achieved to a certain extent, can be classified as a stage of infrastructure development. This is the stage where foreign investment has been transformed from a policy that regulates foreign investment to one that attracts foreign investment. In order to open up foreign investment, Korea switched to a negative system that prohibited investment, from a positive system that specified the industries allowed foreign investment.

The third phase (1990–1997) was a liberalization phase in which the government relaxed regulations on foreign investment and actively promoted openness. In 1991, the Foreign Investment Notification System was adopted, and in 1992, it was converted to the principle notifications and exceptional permissions. Unlike the strategy of aggressive liberalization of emerging industrial countries in East Asia, Korea continued its closed structure to the foreign capitals until the 1997 foreign exchange crisis. Even in the era of globalization that began in 1990, the driving force behind Korea's industrial development was reliance on automobiles, shipbuilding, and semiconductors, which were dominated by large domestic companies, Korean companies focused on strengthening the competitiveness of these traditional industries, rather than actively participating in the expansion of international division of labor on a global scale led by companies in developed countries.

The fourth stage is the investment promotion policy after the 1997 crisis, which is a step to promote the attraction of investment that is distinct from the previous policy. The government policy shifted to a full-open policy with foreigner land acquisition, full M & A, liberalization of foreign exchange transactions, etc.

5. Policy Recommendations and Conclusions

Thus far, we have investigated the foreign capital and technology inflows in Ethiopia. In addition, we have examined the various policies that are considered to be in the perspective of incentivized measures, focusing on the experience of Korea along with the characteristics and forms of TT, and the steps, cases, and problems of technology chase in DCs. Through these observations and analysis results, we propose

policy recommendations and their implications expected to apply to Ethiopia.

5.1. Policy Recommendations

Based on Korean experience, Ethiopian field research, and our judgement, ten practical incentivized measures for enhancing the feasibility of sustainable TT are recommended as applicable implementations to supplement Ethiopia's policy. They could contribute to speeding up and facilitating TT in Ethiopia.

Encouraging a system for "learn by doing" with a vigorous spirit and desire for a high level of life and business as the national motivation:

It is recommended to allow more people involved in industry to experience a lot of failures and practice (i.e., "learn by doing"). Ethiopia should also support engineers eagerly to build up the technology capacity by fostering the same national motivation. Encouraging failure experiences can be done by providing a loser resurrection program.

Start from the mature technology with low-level production skill and technology capability:

It is recommended to select the mature technology from the developed countries and support local manufacturers to produce products or systems with imported parts. It is necessary to create the international division of labor by exporting manufactured products to various developed countries in competitive sectors. Expansion of OEM production with companies in developed countries is recommend, and any measures to induce and activate the technology spillover are positive through all channels

Focus on reverse engineering for localization and improvement for TT:

It is recommended to let the stakeholders in advance clearly identify TT status of acquisition, assimilation, mastery & improvement, and technology capacity building for the investment evaluation and decision making. Start from assembling production using the imported parts, then produce the parts, then develop the core and design the imitation product, finally reaching the stage of creating a new product concept. Localization of the production is better pursued through fast reverse engineering rather than FDI. Acquisition and assimilation of the foreign technology by rapid building of human capacity are required to increase the localization rate of parts to a complete product. Prepare the incentivized measures respectively for stakeholders in TT and capacity building for sustainable growth in Ethiopia. Drive METEC aggressively to work on FL and reverse engineering to build

up local technology capability. (Most of the METEC companies are involved in all three forms of TT mechanisms, but co-production oriented).

Specification for TT as technical contracting conditions in FDI:

It is recommended to set up a system to ensure FDI for a means of TT. Specify the details of content in the technical contract for TT and negotiate them with foreign countries as contracting conditions in FDI:

- Free technical information
- Paid technical training
- Priority to the institute in the transfer company for granting technical licenses to other domestic companies
- Priority to transfer companies in cross-licensing with foreign companies
- Guarantee for use of certain percentage shares of domestic parts
- Transferring certain percentage shares of patent rights
- Unconditional guarantees only for domestic companies when transfer company transfers its own stake to the third company

It is strongly recommended to revise the proclamation on investment (Proclamation No 769/2012) to facilitate and address problems on TT activities.

Employment of responsibility management system:

It is recommended to apply a carrot-and-stick approach in all incentives on a strict but fair performance basis—focusing on exports, tax, and bank loans. Determine the amount of tariff refund by an articulate formula set based on the products exported and raw materials imported. Determine the tax cut for facility investment proportionately to investment amount. Determine the bank loans in amount and term for imports linked to import amount for exports and loans for factory building. Apply punishment policy in the event of failure to meet the principle, to the relevant individuals or organizations audited by the General Audit Office.

Diversification of FDI policy oriented in TT:

It is recommended to strengthen the absorption capacity of indigenous technology through specific technical contracts for foreign investment in manufacturing. Insert the localization rate of parts to product or system in FDI as the contracting conditions, and link the localization rate of parts with FDI with better incentives. Diversify the package type of FDI oriented in wholly owned or majority-owned subsidiary into: Equity joint ventures, Contractual joint

ventures, Partnerships or strategic alliances, and pure contracts (licensing, technical assistance).

Establishment of national investment fund-making system:

It is recommended to enact a law on a national investment fund to support the target manufacturing sector through domestic capital. It is necessary to secure investment funds from deposits from national banks, insurance companies, and other public funds. Provide long-term loans at low interest rates are to the target manufacturing sectors under the condition of export promotion.

Enactment of laws to promote specific industries and their technology capacity building and R&D support:

It is recommended to promote the specific industries following the national development plan. It is also recommended to establish government-funded institutions to accumulate technology capacity and support R&D industry by means of special laws. Set up technology transfer centers to foster technology absorption in Ethiopian enterprises.

Inducement and promotion of technology spillover:

It is recommended to utilize all the information and resources involved in technology and initiate the manufacturing through the various channels of TT to increase the technology capacity. Activate the foreign investment, export, and import focusing on the TT and development. Relax and remove constraints hindering the diffusion of technology spillover. Develop sophisticated and customized incentives in all the processes observed in the technology spillover. STI policy in Ethiopia is too general. Set up a separate technology transfer policy in order to avoid missing out on various types of gaps that are present in actual practices of TT.

Support and enlargement of the private indigenous-owned enterprise through credit markets, incentives, PPP, and self-R&D:

It is recommended to protect and raise the indigenous-owned enterprises with corporate ownership or management rights, and technology absorption capability. Set up a system to activate public–private joint R&D by establishing government-funded research institutes. Reduce the government intervention and mobilize the private sectors through the market value chain and PPP. Develop the predictable automatic incentives to support private business and introduce FDI in private sectors with localizing potential. Support self-R&D to lead to creation of their own

innovations as a form of patents and processes by tax-related incentives for the R&D equipment and consumables.

5.2. Conclusion

This report examined Korea's experience in terms of TT, which is now recognized as the most important factor in industrial development through manufacturing. In particular, we have looked at policies and cases with incentivized characteristics in various aspects that can facilitate TT. Based on Korea's experience, practical measures for enhancing the feasibility of sustainable TT by supplementing Ethiopia's policy focusing on FDI were presented.

The conclusion of this project is that Ethiopia, a DC with a lack of technology and capital, should endeavor to raise and nurture indigenous-owned enterprises, even in circumstances where it can only depend on foreign capital investment in order to maintain sustainable development for the future. Meanwhile, indigenous-owned enterprises should focus on capacity building of transferred technology and technology development.

In addition, indigenous-owned enterprises are able to digest the mature technology of developed countries, allowing the stage of technology imitation to be shortened to the stage of their own technology development, and the government should have a long-term policy that avoids impatience among the private indigenous-owned companies to develop their own designed products. It is necessary to systematically provide predictable but consistent long-term incentivized measures that can be implemented and customized in various ways.

"It takes all the efforts of the village to raise a child."
- Proverbs of the American Indian Omar

Finally, we conclude this paper by emphasizing the importance of indigenous-owned enterprises in Ethiopia. Path-pioneering chase to the innovation stage with their own designed products in the international market could not be achieved in Ethiopia without indigenous-owned enterprises.

"It takes all the efforts of the nation to raise an indigenous-owned enterprise with ownership, management right, and technological capability."

However, no matter how good the policies and practices -proposed in the present situation, in order to actualize them in the Ethiopian field, it is necessary to emphasize the importance of the national leaders' will for action, and enhancing the enforcement power of the government.

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Glossary

CDMA	Code Division Multiple Access
DCs	Developing Countries
DRAM	Dynamic Random Access Memory
Ethiopia	the Federal Democratic Republic of Ethiopia
FDI	Foreign Direct Investment
FL	Foreign Licensing
GDP	Growth Domestic Product
GI	General Instrument
GTP	Growth and Transformation Plan
HRD	Human Resource Development
ICT	Information and Communication Technology
METEC	Metals and Engineering Corporation
MoE	Ministry of Education
MoFEC	Ministry of Finance and Economic Cooperation
MoI	Ministry of Industry
MoST	Ministry of Science and Technology
MoUDH	Ministry of Urban Development and Housing
OBM	Original Brand Manufacturing
ODM	Original Design Manufacturer
OEM	Original Equipment Manufacturer
R&D	Research and Development
SKD	Semi Knock Down
SMEs	Small and Medium sized Enterprises

2016/17 Knowledge Sharing Program with Ethiopia:
Gearing up Ethiopia with Innovative Initiatives:
Technology Transfer, Manufacturing, Urban Planning

Chapter 2

Textile Industry Diversification Strategy Development Support

Textile Industry Diversification Strategy Development Support

Hee Cheol Cha (Korea Institute of Industrial Technology)
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Summary

Growth and Transformation Plan 2 for the development of Ethiopian manufacturing industry has been initiated at the request of the 1st project proposal from the Ministry of Industry (hereinafter MOI) of the Federal Democratic Republic of Ethiopia (hereinafter Ethiopia) in August 2016 between the Republic of Korea (hereinafter Korea) and Ethiopia. At the meeting with the MOI of Ethiopia in August 2016, it emphasized the development of textile and leather industry then requested guidance on the development direction of the textile industry. For the development of the Ethiopian textile industry, we suggest that the MOI should find the solution through structural development of the current Ethiopian industry, which is heavily reliant on the cotton fabric. In addition, efforts should be focused on overcoming the limitation of the current manufacturing processes through the development of various textile products with synthetic fibers and improving the global competitiveness of the textile industry through R&D centers and an HRD system specialized in the textile sector.

Since 2010, the Ethiopian textile industry has shown rapid growth, becoming one of the key industries by contributing 3.5% of total exports, 23.2% of manufacturing industry exports, and employing about 35,000 workers in 2015. Though the Ethiopian textile industry plays an important role in increasing GDP, the Ethiopian government challenges in achieving the expected targets for export and employment, along with the low technology level at the local level, low

productivity, low quality, etc., have been recognized as difficulties.

With differentiating the sector of high value added design, planning, sales, etc., and the production sector as a global trend of the textile industry, Ethiopia is in a situation where it needs a practical action plan to realize its implementation. Therefore, this paper provides the consultation for the textile industry development with the development direction of the related industry and structural development of the textile industry. This research undertakes this task, requested by the Ethiopian government, by sharing the development experience of the Korean textile industry. Based on that, we propose the development direction to contribute to the vitalization and development of the upcoming Ethiopian textile industry as follows.

• Current Cotton Industry Structure Development

In the 1980s, the Korean government implemented supporting policies with obsolete equipment replacement along with dyeing & finishing industry development to advance the textile industry structure. Similarly, the Ethiopian government's supporting policies for the cotton industry structure development are required to promote productivity, establishment of a cotton grading system, and quality control.

- Establishment of cotton grading system required
- Implementation of obsolete equipment replacement
- Strengthening the links between streams & technology development
- Ginning, spinning, and knitting technology development
- Strengthening the middle-stream (dyeing & finishing), adding values to the textile products.

• Various Textile Products Development through Synthetic Fibers

Since there is no infrastructure for the polyester production in Ethiopia, focusing on the technology development through the utilization of the current knitting, weaving, and dyeing & finishing facilities by using various imported polyester yarns is required. Then, the effort should be placed on the technology to develop not only blended fabric production but also union cloth production for producing various kinds of products. Ethiopia may need the production facility to produce polyester fabric as raw materials; however it is inapplicable in Ethiopia because there is no petrochemical facility. Polyester production is possible using the spinning facility with imported chips; however a careful approach and measurement is required to achieve global competitiveness.

• R&D Center Specialized in Textiles & HRD System Establishment

For the future textile industry growth engine, with the infrastructure

establishment for producing high-value-added products through linking the value chains between the streams of the textile industry, training research professionals from the material planning to new product development should take priority over training field professionals. In order to realize this, a textile technology development institute is required for implementing technology support, training professionals, pilot product development, fashion/clothing, and marketing through R&D activities. This could be done through technology cooperation with advanced textile countries.

• Establishment of the Global Standard Testing & Inspection System Development

Ethiopia needs to establish a textile/clothing testing & certification center, which can contribute high-value-adding for the Ethiopian products by providing certification service regarding textile-, clothing-, and leather-related products as an international certified testing institute.

1. Introduction

1.1. Implementation Background

1.1.1. Policy Consultation Request Background & Context

Growth and Transformation Plan 2 (GTP2) for the development of the Ethiopian manufacturing industry has been initiated by the request of the 1st project proposal from the Ministry of Industry (hereinafter MOI) of the Federal Democratic Republic of Ethiopia (hereinafter Ethiopia) in March 2016 between the Republic of Korea (hereinafter Korea) and Ethiopia. Currently, the Ethiopian government has established the implementation plan for developing various products made of synthetic fiber materials with the intention of expanding its textile industry from being cotton focus to synthetic fibers. In addition, the Ethiopian government has studied the establishment plan of the specialized textile R&D center that could promote infrastructure, facilities, and systems within the industrial zone for manufacturing companies.

Although current Ethiopian industries are mostly light industries and focused on textile, sewing, leather & leather products, food, medicine, and raw materials, with GTP2, much of the effort has been on developing various industry sectors including electricity, electronics, information, telecommunication, petro-chemical, bio, and high-value-added textile and leather, which requires technology, capital, and HR.

GTP2 is expected to achieve 22% of economic growth and to promote a doubling of the contribution of manufacturing industry towards GDP. It is also

expected to promote Ethiopia into mid-level-income countries by 2025. Thereafter, the Ethiopian government will put its effort continuously into the high-value-added industry. To achieve this, the Ethiopian government wishes to share various development experiences of Korea regarding the manufacturing industry.

At the MOI, in August 2016, we engaged in discussion on the 2016/2017(KSP) MOI, and the MOI stated that they are mostly focusing on the development of the textile & leather industry; therefore, the research regarding the direction of textile industry development was requested. Regarding the industry structure development for the current cotton-focused textile industry, agendas requested were as follows:

(1) Structure development for the current cotton-focused industry
(2) Development of various products with synthetic fiber materials
(3) Textile R&D center establishment plan

Since Ethiopian textile industry is at the initial stage, utilizing the tax benefits towards EU and US markets and promoting gradually logistical benefits, favorable environment for cotton farming, abundant labor, and lower costs are recommended, rather than expanding its development efforts throughout the textile industry as a whole.

With advantages of lower labor costs and favorable tax benefits, for the short term, Ethiopia could overcome its disadvantages through attracting FDI, accumulating the capital, and strengthening the technical capacity. It could then focus on sustainable industry development for the future.

1.1.2. Demand, Research Range and Method, and Research Direction

Since 2010, the Ethiopian textile industry has shown rapid growth and has become one of the key industries, contributing 3.5% of the total export, 23.2% of manufacturing industry export, and employing about 35,000 workers in 2015. Nevertheless, the Ethiopian government being behind in achieving the expected targets for exports and employment, and low technology level in localities, low productivity, and low quality, have been recognized as difficulties.

With differentiating the sector of high-value-added design, planning, sales, etc. and the production sector as a global trend of the textile industry, Ethiopia is in a situation where it needs a practical action plan that can lead its implementation. Therefore, we have provided consultation for the textile industry development, recommending the development direction of the related industry and structural development of the textile industry.

This research presents a foundation survey, action plan consultation, etc., for the related industry development and structural development of the textile industry, as requested by the Ethiopian government. For Ethiopian polyester textile industry development, the polyester textile industry development roadmap is proposed based on the development direction and strategy of the polyester textile industry implemented in Korea. In addition, establishment and operation plan of textile related R&D centers are proposed for the purpose of textile experts training and strengthening technical support for small- and medium-sized companies.

To establish the strategy for diversification of the Ethiopian textile industry, we have prepared a SWOT analysis and identified an improvement direction through the analysis of FDI status and textile industry stream status.

We surveyed synthetic fiber and related roadmap data, HR training, policy consultation, textile R&D centers for small & medium size companies, research institutes, etc., for the development of textile industry structure development through the analysis of experiences and cases of Korea.

Regarding the polyester textile industry development history, there are Korean polyester textile industry development stages analysis and Ethiopian polyester textile industry roadmap.

For the suggestion of the establishment and operation plan of a textile sector R&D center, we studied the demand by streams and suggest the life cycle system of HR training for textile experts and technical support infrastructure of respective process in weaving/knitting, dyeing/finishing, clothing/sewing, etc.

1.2. Structure of Research

This research is organized as follows. The status of the textile industry in Ethiopia, including textile industry policy, current status, difficulties, and solutions, is discussed in part 2. The Korean textile industry development experience is discussed in part 3, and the conclusions and policy proposals are given in part 4.

2. Status of Ethiopia

2.1. General Status

The Federal Democratic Republic of Ethiopia located on the end of Northeastern side of the African continent and surrounded by Somalia, Djibouti, Sudan, Kenya, and Eritrea. The land area of the country is about 1,104,300㎢, which is five times

that of the Korean Peninsula. In the middle part of the country, there is lowland with short of rainfall and high temperatures towards the border; this area mostly consists of desert or grassland. Ethiopia has abundant labor force, especially with its relatively young population.

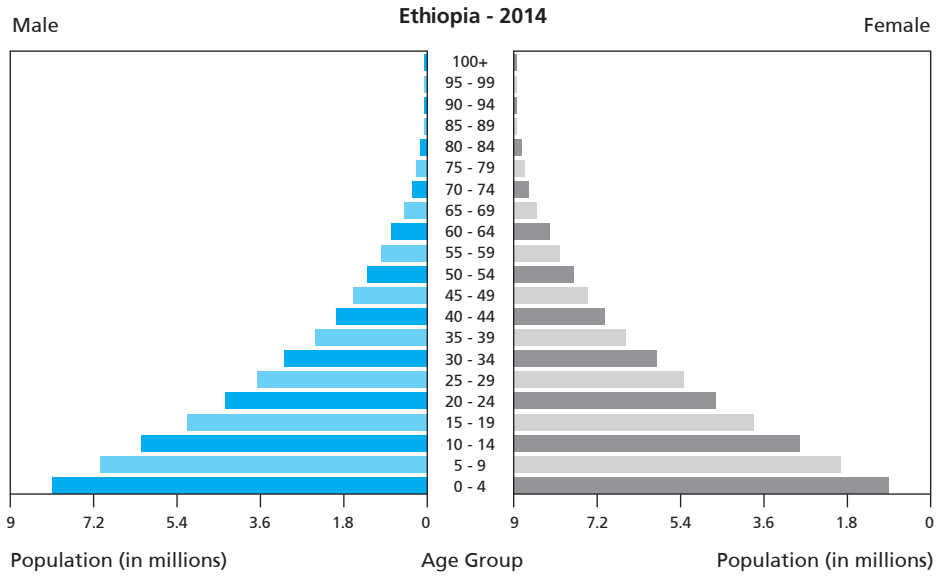
〈Table 2-1〉 Ethiopia, General Information

Land Size	1,104,300km^2 (5.1 times that of Korea)
Weather	Warm: Apr–May, Rainy: Jun–Sep, Cold: Oct–Jan, Rainy: Feb–Mar
Population	9,9460,000 (Rural 83%), in 2015, ***CIA World Factbook***
Avg. life expectancy	60 (Male 57.7, Female 62.3), in 2013
Ethnics	Oromo 34.5%, Amhara 26.9%, Somali 6.2%, Tigray 6.1%, About 80 different ethnicities
Religion	Ethiopian Orthodox 43.5%, Islam 33.9%, Protestant 18.6%, etc.
Language	Amharic, English, local dialects, etc.
Gov't	Federal republic, parliamentary system
Illiteracy	50.9%(Female : 58.9%), in 2015
School attendance	Elementary 90%, in 2015

Source: CIA (Central Intelligence Agency), The World Factbook, 2015.
WB (World Bank), World Development Index, 2015.

Consisting of various ethnicities, Ethiopia is the second most populous country among sub-Saharan countries, after Nigeria, with about 99 million people, 83% of whom living in rural areas. The population growth rate is 2.89% (2014), and most populated age is between 0 and 14 years old with 44.2%, followed by the 25-to 44-year group.

[Figure 2-1] Population Structure of Ethiopia



Source: CIA (Central Intelligence Agency), The World Factbook, 2015.

2.2. Major Economic Status

〈Table 2-2〉 Ethiopia Major Economic Index

Section	2011	2012	2013	2014	2015
Nominal GDP (100 mil.)	305	422	443	529	582
GDP per Capita ($, PPP*)	1,171	1,263	1,380	1,501	1,604
Actual GDP Growth Rate (%)	11.2	8.6	10.5	9.9	8.7
Export ($, mil.)	3,029	3,258	2,967	3,260	2,856
Import ($, mil.)	8,329	10,547	12,093	14,597	13,404
Trade Balance (100 mil.)	-53	-73	-91	-113	-105
Total Liability (100 mil.)	86	105	126	161	174
Foreign Exchange (100 mil.)	23	23	25	29	26
Inflation (%)	33.1	22.9	8.1	7.4	10.6

Source: EIU (Economist Intelligence Unit), IMF 2016.

Nominal GDP has shown steady growth from 44.3 billion USD in 2013, 52.9 billion USD in 2014, to 58.2 billion USD in 2015. However, the growth rate of actual GDP has decreased a little over the same period, with 10.5% in 2013, 9.9% in 2014, and 8.7% in 2015.

Actual GDP growth rate in 2015 for East Africa was 6.6% and 4.5% for Africa; Ethiopia recorded a much higher growth rate of 8.7% and became an emerging market. Especially, as the 2nd most populated country with about 100 million people, Ethiopia has a substantial domestic market with potential. However, the continuous trade deficit and high inflation rate are major issues of the Ethiopian economy. As of 2015, Ethiopia is heavily reliant on imports, which contribute 13.4 billion USD to the total trade volume of 16.2 billion USD.

The manufacturing industry sector contributes 11% of GDP and 25% of product export and it has recorded a high 15% annual growth rate between 1991 and 1999. Ethiopia is recognized as one of the countries in Africa with the most potential in terms of manufacturing industry with lower cost and abundant labor forces, advantages in logistics to EU & US market (tax benefits), and relatively high productivity. The manufacturing industry in the past was weak due to the lack of social infrastructure, strict government control, and investment. Therefore, the current Ethiopian government has been implementing the 2nd 5-year economy development plan, with effort focusing on developing the manufacturing industry through promoting FDI into the country.

2.3. Textile Industry Status and Characteristics

The contribution level of the Ethiopian textile industry to the total industry production is 10.3%, accounting for 3.5% of total exports. The textile industry consists of cotton (10%) and knitting/clothing (90%). It also contributes 23.2% of manufacturing exports, as of 2015.

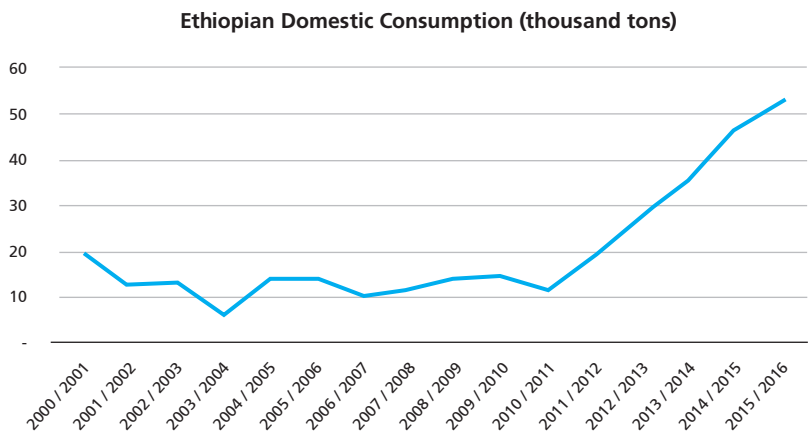
As of 2016, there are 163 cotton farms and 143 textile- and clothing-related manufacturing companies in Ethiopia, which are mostly state owned companies. However, recently the number of private company has been rapidly growing. Employment by textile companies is at about 53,000 and contributes 7% of the total manufacturing industry. With population growth rate of 2.8% and a high rate of economy growth, steady growth of the domestic market is expected (Kim and Park, 2003).

Textile products are mostly cotton products, and Ethiopia has a good environment and weather conditions for cotton farming; therefore, natural textile production is possible with hemp, ramie, linen, bamboo, silk, etc. Other than

natural raw materials, synthetic fibers, wool, dyes, etc., depend on imports. Major textile-related export products are yarn, fabric, clothing, crafts, etc., and are steadily growing (Ryu, 2012).

From 2000 to 2012, Ethiopian cotton consumption has been fairly stable, with an average of around 15 000 tons of cotton lint. Consumption has strongly increased since 2010, being multiplied by a factor of 5 within 5 years.

[Figure 2-2] Evolution of Cotton Demand in Ethiopia from 2000 to 2015



Source: USDA (U.S. Department of Agriculture), Annual Cotton Report, GAIN Report Number ET1512, 2015.

〈Table 2-3〉 Top 4 Textile Export Products

(Unit: $, mil.)

	Item	05/06	06/07	07/08	08/09	09/10	10/11	11/12
1	Yarn	-	-	-	3.7	8.5	9.1	5.1
2	Fabric	4.2	4.4	4.6	3.7	6.3	23.0	6.9
3	Garment	6.9	8	9.7	6.6	6.7	26.7	47.8
4	Hand-woven products	0.1	0.2	0.4	0.4	1.7	3.4	3.5
Total		11.1	12.6	14.6	14.4	23.2	62.2	63.4
Avg. Annual Growth Rate			13.5	15.8	-1.4	61.1	168	

Source: WTO (World Trade Organization), World Trade Statistics 2015.

The Ethiopian textile trade is in the growth stage; however, textile/clothing are not included on the top 10 export products, though recent Ethiopian GTP policy & custom tax benefits from EU & US have been promoting the textile/clothing exports. Textile/clothing export contribution of the total exports increased from 1.1 % (2010) to 2.46 % (2012). Major export countries are Germany, Turkey, China, and Italy, , and major imports are filament fabric, knitting, and staple yarn, etc., from China, India, and Vietnam.

Of the total fiber requirement by the Ethiopian textile industries, around 80 % is produced and fulfilled from locally produced fibers. The average annual fiber requirement of Ethiopian spinning mills is around 70 thousand tons. The performance evaluation of GTP1 in the cotton production sector shows the average yearly lint cotton production for the first GTP I period was 58 thousand tons. Hence, the difference of fiber demand and supply from local production is balanced by importation. <Table 2-4> below shows the amounts of textile fibers imported for the last 20 years.

〈Table 2-4〉 Import of Fiber Products from 1997 to 2016

Year	Fiber		
	Value (ETB)	Value (USD)	Net Wt. (Kg)
1997	62,067,603	9,247,535	8,209,523
1998	43,631,160	6,131,589	8,570,678
1999	48,912,341	6,158,926	40,574,961
2000	40,129,193	4,883,501	8,697,873
2001	35,735,938	4,224,855	5,878,598
2002	32,851,122	3,834,254	5,076,240
2003	51,700,466	6,011,752	10,750,829
2004	33,977,128	3,934,177	8,207,068
2005	43,361,634	4,954,030	10,956,249
2006	48,915,882	5,568,304	6,317,023
2007	55,402,535	6,123,383	5,908,162
2008	40,027,251	4,131,973	6,452,141
2009	44,449,492	3,743,777	4,533,941
2010	69,017,404	4,738,742	3,494,638
2011	87,472,686	5,125,943	2,301,253
2012	77,453,201	4,335,326	3,059,695
2013	99,818,105	5,309,445	2,571,833
2014	364,670,062	18,103,520	7,323,209
2015	196,044,944	9,433,401	4,180,497
2016	172,542,443	7,863,140	3,748,036
Total	1,648,180,590	123,857,574	156,812,447

Source: ERCA (Ethiopian Revenues and Customs Authority), http://www.erca.gov.et.

The input material supply in the whole value chain is not balanced. Weaving and knitting factories are using imported yarns, especially those made of synthetic fibers. The yarn spinning, fabric weaving, and knitting and processing sub sectors are bottlenecks in the textile manufacturing value chain, and these are key investment promotion areas in the textile sector. The importation of garments is very high, as can be seen from <Table 2-5>. Even though the growth of the garment subsector is based on export orientation, the diversity of products is very limited, and new designing and product development is required.

〈Table 2-5〉 Ethiopian Yarn, Fabrics, and Garment Import Data by Major Products

(Unit: 1,000kg,$)

Year	Yarn		Fabrics		Garment		Total Net Wt.	Total Value
	Net Wt.	Value	Net Wt.	Value	Net Wt.	Value		
1997	14,205	31,056	10,155	30,002	6,303	12,392	30,662	73,451
1998	17,336	23,810	10,437	36,265	6,495	24,287	34,268	84,362
1999	46,017	19,620	16,461	33,943	11,507	33,629	73,985	87,192
2000	12,968	16,000	10,837	36,327	16,812	34,594	40,617	86,921
2001	9,021	13,856	15,156	44,190	18,515	51,251	42,692	109,296
2002	11,746	20,526	15,143	39,759	17,872	52,537	44,760	112,822
2003	18,396	23,211	25,012	59,656	27,725	69,237	71,133	152,104
2004	15,193	19,057	22,724	56,600	26,509	83,000	64,426	158,656
2005	19,526	26,194	24,889	73,562	31,646	112,733	76,061	212,489
2006	13,095	20,917	26,253	75,002	34,869	160,232	74,217	256,151
2007	13,165	24,179	24,413	70,884	32,450	153,963	70,028	249,026
2008	17,580	32,671	24,576	75,596	27,775	112,862	69,931	221,128
2009	14,366	24,399	22,720	84,067	25,186	121,027	62,272	229,493
2010	17,588	36,035	25,544	96,965	36,757	202,272	79,889	335,272
2011	17,887	43,783	25,278	104,014	31,794	175,323	74,960	323,119
2012	22,653	53,947	27,569	123,058	39,857	266,632	90,079	443,637
2013	21,373	52,559	29,381	129,058	44,898	294,941	95,652	476,558
2014	29,729	74,888	48,396	138,804	119,426	343,502	197,551	557,194
2015	29,985	73,337	47,482	182,004	68,681	403,998	146,147	659,339
2016	35,487	71,833	50,354	148,675	60,119	384,544	145,960	605,052

Source: ERCA (Ethiopian Revenues and Customs Authority), http://www.erca.gov.et.

After the encouraging results achieved in the GTP1 period, the GTP2 of the textile sector has been planned to achieve targets such as earning 779 million USD from exports in 2019/20, creating 174,000 employment opportunities, increasing the productivity of the sector on average of from 63% to 80%, cultivating 490,000 hectares of land for cotton, and attracting 132 potential investors to the sector. The major input requirements for all sections in the textile value chain for the GTP2 period, taking the last year of GTP1 as a baseline, is summarized below in <Table 2-6>.

〈Table 2-6〉 Raw Material Requirement in the table

(Unit: tons, meters, gross, pcs)

S.N	Types of input material	Unit	Base line 2014/15	Input Requirement				
				2015/16	2016/17	2017/18	2018/19	2019/20
1	Raw Cotton	10^3 tons	178	495	700	990	1,375	1,820
2	Lint Cotton		66	183	259	366	509	673
3	Yarn (weaving)		22	46	57	79	119	762
4	Yarn (knitting)		24	50	62	86	129	162
5	Synthetic Fiber		8	46	66	89	85	103
6	Wool Fiber		44	5	8	12	13	16
7	Regenerated Fiber		14	15	16	17	14	19
9	Woven Fabrics	10^6 meters	38	113	145	175	214	232
10	Knitted Fabrics	10^6 tons	9	22	34	45	60	69
11	Threads		137	828	1,191	1,504	1,953	2,190
12	Buttons	10^6 gross	3	7	10	13	16	19
13	Zippers	10^6 pcs	23	68	88	106	130	141

Source: ETIDI (Ethiopian Textile Industry Development Institute), http:// www.german-tech.org.

〈Table 2-7〉 Textile/Clothing Trade Ranks

(Unit: $, mil.)

Rank	Export		Import	
	Country	Amount	Country	Amount
-	Total	71,212.36	Total	472,095.79
1	Germany	29,933.82	China	329,794.06
2	Turkey	12,232.95	India	33,641.94
3	China	6,270.42	Vietnam	17,828,20
4	Italy	5,749.89	Thailand	17,146.91
5	Sudan	3,729.92	Indonesia	10,942.22
6	US	3,455.61	Other Asian	8,086.61
7	India	2,046.89	Turkey	6,197.10
8	UK	1,549.59	Saudi Arabia	5,792.09
9	Portugal	1,143.51	Pakistan	4,514.46
10	Djibuti	1,054.68	Germany	2,874.56

Source: UNCTAD (United Nations Conference on Trade and Development), Economic Development in Africa Report 2015, http://www.unctad.org.

Major Export Benefit

Ethiopia is one of the beneficiary countries under the African Growth & Opportunity Act (hereinafter AGOA); therefore Ethiopian export products to US have no custom tax and no quota barriers. AGOA has been enacted for promoting trade between sub-Saharan countries and the US to help to the former enter the global economy system and to tackle chronic poverty and famine problems. Since Oct 1, 2000, it has started with 34 beneficiary countries and now has been extended to 40 countries including Kenya, Nigeria, Cameroon, Congo, Ghana, Mozambique, and South Africa.

According to a research result of the Brookings Institution, if the US were to terminate AGOA now, then it would bring a huge negative impact on African economy. Therefore, the US is likely to continue with AGOA; however, if the US extends the beneficiary countries to those in other continents, it would also negatively impact on African exports, decreasing African market share in the US (Schneidman and Lewis, 2012).

Everything But Arms (hereinafter EBA) entered into effect on Mar 5, 2001, with 100% import custom benefits for all products from Africa but arms to the EU for promoting development of the least developed countries. Estimated

imports to EU total 6.2 billion euro; the beneficiary products are consist of 7,140 products including textile, animal, shoes, vegetable, banana, sugar, and rice. For the agricultural products, there is a suspension system, and it usually benefits the textile industry in the least developed countries.

FDI in the Textile Sector in Ethiopia

Massive investment came from other countries including Turkey & India.

- Turkey – Ayka Addis Textile & Investment Group: Plans to invest 100 million birr to the current Alem Gena RMG (Ready Made Garment)
- India – CLC Industries Plc: Planted cotton on 2,500 ha, harvested since Dec 2011. Producing yarns from the spinning factory, where they invested 70 million USD
- India – Spintex: Plan to establish a spinning factory with capacity of 100 tons per day and a 50,000 ha cotton farm
- China – Lianfa Textile: Plan to establish large scale knit & clothing factory near Addis Ababa with investment of 500 million USD
- Bangladesh – BDH Group: Plan to establish a clothing factory in Mekele with investment of 30 million USD
- UK – H&M, Tesco, Primark: Plan to relocate production sites to Ethiopia

Korean FDI companies include Shin TS, Myung Sung, and KET; these are invested or are planning to invest in the Bole Lemi industrial zone. In the case of Shin TS, it is currently operating a factory with 3,000 employees and plans to expand continuously; Eland, SaeA, and other conglomerates are also considering the investment.

[Figure 2-3] Shin TS Bole Lemi Factory

Source: IPDC (Industrial Parks Development Corporation), http://www.ipdc.gov.et/index.php/en/industrial-parks/bole-lemi-i.

The Hawassa industrial park is established on 300 hectares of land in the southern part of the country in Hawassa city. There are 37 shades, of which six are allotted for domestic investors. As of March 2017, 13 industries are operational (some started production, some importing machines, some under installation and commissioning). The industrial park will have a renewable and dedicated electric power supply with a zero liquid discharge effluent treatment plant. When it becomes fully functional, it will employ 60,000 citizens in two shifts.

[Figure 2-4] Hawassa Industrial Park

Source: IPDC (Industrial Parks Development Corporation), http://www.ipdc.gov.et/index.php/en/industrial-parks/hawasa

2.4. Current Issues of Ethiopian Textile Industry

〈Table 2-8〉 Current Issues of Ethiopian Textile Industry

Issues	Contents
High Logistic Costs	- High land logistic costs - Complicated custom clearance requirements also contribute to longer logistics cycles
Low Value-Added	- Obsolete facilities - Lack of textile finishing technology and HR - Low in recognition of cost control & incentives - Low in recognition of quality and design - Small domestic market
Under Developed	- Shortage of raw materials and parts from local suppliers - Difficult to supply in time - Poor road conditions
Environmental Factors	- Poor communication infrastructure - Lack of finance, marketing, and management - Time consuming and not-transparent public administration

Source: KITECH (Korea Institute of Industrial Technology), 2013.

Ethiopia, as a landlocked country, requires higher costs and times for land logistics and has a complicated custom clearance process, since it only can go through Djibouti. According to the Trade Logistics Index of the World Bank, Ethiopia went down in the ranks from 104 in 2007 to 141 in 2012, with an average of 42 days for the import cycle for a container. In the case of Rwanda, located even further into the central Africa, it takes only about 31 days (World Bank, 2013a).

Logistics costs based on the 20ft container are higher than other African countries'. For example, it costs about $1,000 USD more compared with Tanzania in terms of imports (World Bank, 2013b).

Current factories produce only for domestic markets due to the low value-added, obsolete facilities, lack of HR, and so on. Therefore, quality and technology applied are just of a low or medium standard, which are not up to global standards. In addition, most machines are imported due to the underdeveloped machinery industry. These conditions are disrupting the production cycles. Although the Ethiopian government and global organizations are trying to develop and implement HR training, the quality of HR is not fit to the actual job sites. Therefore, in case of Shin TS, about 40 Vietnamese were invited into their factory to be trained on the site.

For the domestic factories, low recognition in quality is problematic. Due to the low recognition of quality, there is no quality control system, and it leads to poor quality products and no guarantees. They can only access low-quality raw materials due to underdeveloped related industries, such as ginning factories with obsolete facilities and low-quality imported synthetic fibers. In addition there is no cotton grading system; therefore, the various qualities of cotton are all mixed together in the market.

There is almost no textile-related subsidiary materials industry in Ethiopia, with only few companies with low quality and capacity; therefore, there is shortage of supply from local industries.

There are several substitute solutions to improve the current situation in Ethiopia. For increased value-added production rather than focusing on low-cost production, it is necessary to enter the high value-added sector through the development of textile industry structure. Ethiopia is in a similar situation to that of Korea in the past; therefore, similar strategies were applied in Korea and it has developed strongly as a result.

[Figure 2-5] Ethiopia Textile SWOT Analysis & Solutions

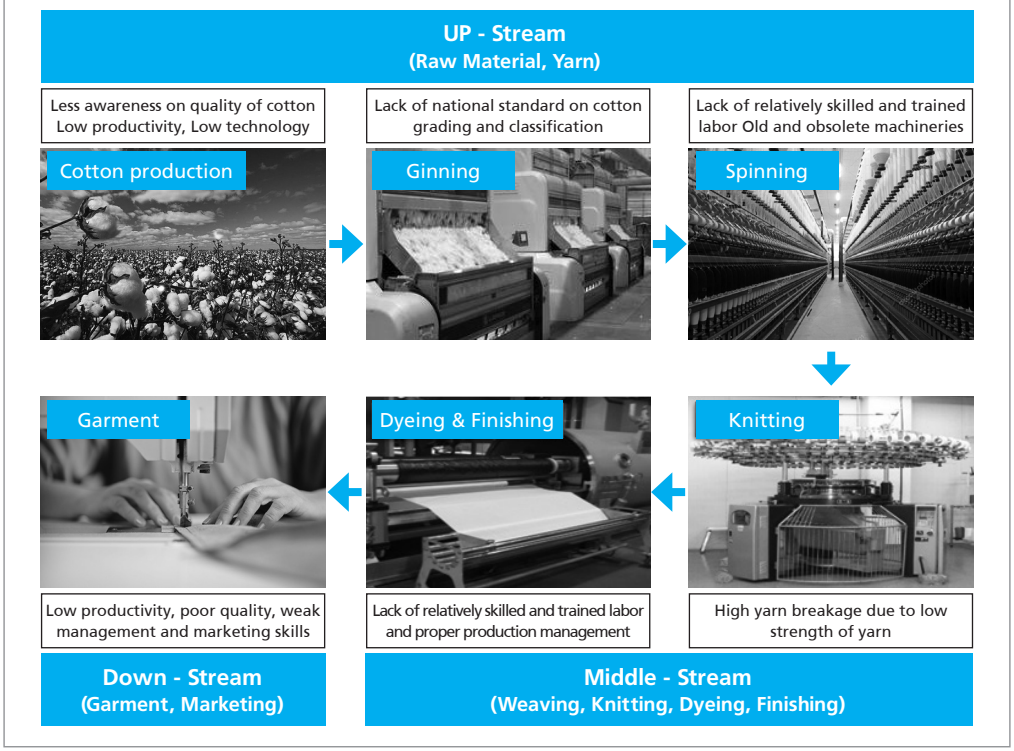
Internal Factors / External Factors	Strengths (S)	Weaknesses (W)
	• Cheaper production cost • Vertical production system • Huge potential of cotton production • Friendly management environment • Growth of domestic markets • High accessibility to regions in East Africa	• Lower value added production • High distribution cost • Lack of experienced technicians • Lack of management capabilities • Delay of procedure of administrative treatment • Small-scale and lower developed textile / garments industry
Opportunities (O)	**Strengths-Opportunities (SO)**	**Weakness-Opportunities (WO)**
• Increase in labor cost in China and Asia • Trend of production base migration to Africa • Advantageous export condition by virtue of AGOA, EBA benefits	• Actively attract FDI through lower production cost and vertical production system	• Promoting development of textile industry through cultivating technical professionals and innovation of lower value added production
Threats (T)	**Strengths-Threats (ST)**	**Weakness-Threats (WT)**
• Intensified competition to attract FDI within regions • Inflow of lower cost products from China • Possibilities of reoccurrence of disputes within region • Occurrence of natural disaster such as drought, flood	• Developing self-reliance of textile/garments industry based on improving cotton production and export benefits	• Effort to improve company environment such as reducing distribution cost by establishing sustainable infrastructure

Source: KITECH (Korea Institute of Industrial Technology), 2013.

To analyze each implementation solution, low-cost production will not be sustainable in the long term as it develops as time goes by. Therefore, it will be hard to sustain as the labor cost will also rise. In addition, for the WO solution, it focuses on production efficiency, logistics, etc. It is doubted whether the low-cost production can be sustained; therefore, there is limitation in this respect as well.

Furthermore, in terms of structure, it is restricted to the low quality sector based on the global textile industry value chain due to weakness in changing circumstances, so it is hard to approach with long term strategies. By improving the Ethiopian textile industry on to the high value-added sector, the WT solution can overcome most of the problems suggested with the solutions above; however it requires more time and capital.

[Figure 2-6] Textile Streams Issues Analysis



Source: https://www.google.co.kr/search?q=%EB%AA%A9%ED%99%94&newwindow=1&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiJrPfVlO3WAhWEipQKHRA1C24Q_AUICigB&biw=1534&bih=708#imgrc=cr0Agyq8nv7HfM:&spf=1507882672619
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3. Development Experience of the Korean Textile Industry

3.1. Development History of the Korean Textile Industry

From the 1910s, the modern textile industry started with cotton spinning/weaving factories, and in 1950, most of the textile factories were destroyed during the Korean War. Starting with Chosun Spinning & Weaving (1917) and Gyeongsung Spinning & Weaving (1919), the textile industry contributed 12.5% to total industrial production in 1940s, then after the Korean War, agriculture/fishing industry accounted for 47.3% and manufacturing just 9.0% of GDP.

Korea reconstructed and expanded its textile production facilities through its Spinning/Weaving Emergency Reconstruction Plan (1953–1957). With that, the Korean textile industry replaced the imports and achieved self-sufficiency in natural fibers made of cotton, wool, silk, etc. in 1956. From 1957, the necessity of the obtaining of foreign currencies was on the rise due to the decrease in FDA.

Since the textile industry is effective for job creation, the Korean government actively promoted its transition from an import-oriented to a strategic export industry. Through the 1st 5-year Economic Development Plan (1962–1966), the Korean textile industry produced nylon and other synthetic fibers with petro-chemical fiber production and started focusing on the export-oriented industrialization.

* Textile Export ($, Mil.): 7(1962) → 572(1971), increased 82-fold
* Total Export Percentage Share (%): 12.7(1962) → 53.6(1971), increased 4-fold

With stated production of petro-chemical fibers with nylon, acrylic, etc. by the Korean government's export supporting policy followed by increased demand in the global market, the Korean cotton spinning/weaving industry transformed into an export-oriented industry. However, it also increased the competition between the companies in domestic markets and the competition between the companies to expand their facilities much more than required for domestic demands.

For this, the Korean government enacted the Temporary Measures Act (1967–1979) to initiate the permission and the registration of new facilities to the government and implemented the replacement and adjustment of obsolete facilities in six different types of business in spinning/weaving industry with new business control.

With the development of a reasonable promotion plan for the textile industry (1969), the Korean government implemented the collectivization of small and medium companies or micro companies and promoted global competitiveness through establishment scale permission by business type, proper scale per company, priority permission to exporting companies, etc. In 1967, the first Guro industrial complex was established, and for the mass production of petro-chemical fiber products, the Daegu industrial complex was established in 1969.

In the 1970s, petro-chemical fibers were leading the domestic market and the economic development with an increase of production and high growth rate of clothing exports. Throughout the 1970s, the textile exports recorded 13-fold growth and contributed 30% to the total export amount. In addition, for the same period, clothing exports growth rates recorded 33.3%, and Korea was considered as one of 'Big 3' in global textile trade market, along with Hong Kong and Taiwan.

The Textile Industry Modernization Promotion act was enacted (1979~1986) due to the demand of developing non-price-competition by quality development, technology/design development, and of addressing the issues including soaring price of synthetic fibers due to the oil shock (1973, 1979). This strengthened the import textile quota from advanced countries (Park, 2012).

By strengthening of innovative capacity with the implementation of obsolete facility replacement support, technology development, quality development, HR training, etc., the Korean government allowed the new facility establishment and released the restrictions on the facilities for strengthening overall competitiveness of the textile industry and promoting free competition between the domestic companies.

The Korean government also jointly established the Fund for Modernizing Textile Industries (25 billion KRW, Government/Private Joint Funded) and managed the Korea Federation of Textile Industries..

To transfer from government oversight to a free competition market economy, the Industrial Development act (1986–1999) was enacted to promote the rationalization and balanced development between all industries. To that end, the Korean government collectivized seven different acts for promoting specific industries, including machinery, shipbuilding, textile, petro-chemical, steel, and non-steel.

In order for them to promote balanced development & rationalization of the whole industry, the Korean government merged respective promotion policies into one. Then they selected nine rationalization industries among structural recession,

declining industry, and promising industry, and supported them with new entrant control policies, obsolete facility replacement funds, etc.

The weaving and dyeing/finishing industry were relatively weaker than other industries, so the Korean government designated them as rationalization industries, then supported them with policies including facility renovation and replacement, changing and closing business, dyeing facility registration, providing dyeing waste water treatment facilities, etc.

* Weaving Rationalization (1986.7–1997.12, total of 11 years 6 months, extended 3 times)
* Dyeing/Finishing Rationalization (1987.1– 1988.12, 2 years)

As a single item, it surpassed 10 billion USD exports for the first time, then from the end of the 1980s, the Korean textile industry started to move its production facilities to less developed countries with abundant labor forces, including China, South East Asian countries, etc.

The Korean government established dyeing and finishing industry complexes in Daegu and Gyeeonggi area to promote the technology development and cost reduction by common waste water treatment processing. These complexes are as follows.

* Bisan Dyeing Complex (1981): Quality Development in Daegu/Gyeongbuk, Synthetic Fiber Oriented
* Banwol Dyeing Complex (1987): High Value-added in Capital Area, Cotton-/Knit-Oriented

The Korean government started the Industry Foundation Technology Development project and Industry Development Fund, to promote technology and quality development..

Since the WTO system started (1995), the textile quota has been abolished step-by-step and subsidies have become unavailable. In addition, by entering the OECD in 1996, Korean domestic markets were rapidly opened to others.

After the financial crisis in 1997, the Korean government implemented the restructuring, high value-adding, and differentiation policies to improve profitability, so that Korean textile industry could transfer to high quality, high performance, and technical textiles. To do so, the Industry Development Law (1999) was enacted to replace the Industrial Development Act.

The Korean textile industry focused on the technology development by cooperating, merging with other industries, expanded technology development, and parts and materials development. After the textile trade liberalization in 2005, countermeasures became needed to compete in the global market with the less developed countries and the advanced countries for the latest technology competition.

Started from Daegu, the textile trade center, for transforming the textile industry structure from the mass production to small quantity batch production, the 1st stage (1999–2003) and the 2nd stage (2004–2008) of the Milano project were launched.

Guide lines and future blue prints were introduced through the Milano project to establish the long-term strategies and to propose the future prospect of the textile industry for improving technology textile productivity, textile IT convergence, strengthening design/brand competitiveness, etc.

From 2007, the New Textile Strategic Technology Development Project was initiated in order to develop the key advanced technology for future development engine along with securing original technology of super textiles, nano complex textiles, smart textiles, etc. For this, textile/fashion cooperation projects between the streams were being implemented into two divided sectors: textile and fashion (Textile Fashion Industry Association Industry Research Team, 2012).

The Korean government is actively promoting the development of high-intensity composite fibers similar to the carbon fiber that is applicable to space projects, windmill blades, etc., and selection of future promising materials for the technical textile industry, technical innovation of super material convergence. It has also established the foundation for the technical textile industry including IT, BT, NT convergence, etc. (Lee, 2013).

〈Table 2-9〉 History of the Korean Textile Industry in Brief

Year		Content
1950s	1959	PVA (polyvinyl alcohol) Textile Production Nylon, Stretch Production
1960s	1961	Conclusion of Short Term Arrangement (STA) on Cotton Textiles
	1962	Conclusion of Long Term Arrangement (LTA) on Cotton Textiles (1962–1973)
	1963	Nylon Production (Korea Nylon Co., Ltd.)
	1967	Enactment of Textile Facility Temporary Act Acryl SF Production (Hanil Fiber Industry Co., Ltd.)
	1968	Polyester SF Production (Daehan Fiber)
1970s	1973	Reached 100 million USD in exports (Hanil Fiber Industry Co., Ltd.) Reached over 100,000 tons of annual chemical fiber sales
	1974	Conclusion of 1st MultiFiber Arrangement (MFA)(1974–1977) - Agreed on an import quota system : Arranged between 34 exporting nations and nine importing nations
	1978	Conclusion of 2nd MFA (1978–1981)
	1979	Enactment of Textile Industry Modernization Act
1980s	1982	Conclusion of 3rd MFA (1982–1986)
	1986	Enactment of Industrial Development Act (1986–1999)
	1987	Reached 10 billion USD in textile exports (First among single products)
	1988	Reached over a million tons of annual chemical fiber sales
1990s	1994	Reached 10 billion USD in fabric sales
	1995	Conclusion of Uruguay Round Fiber Agreement (1995–2005)
	1996	Reached 2 million tons of annual chemical fiber sales
	1999	Enactment of Industrial Development Act

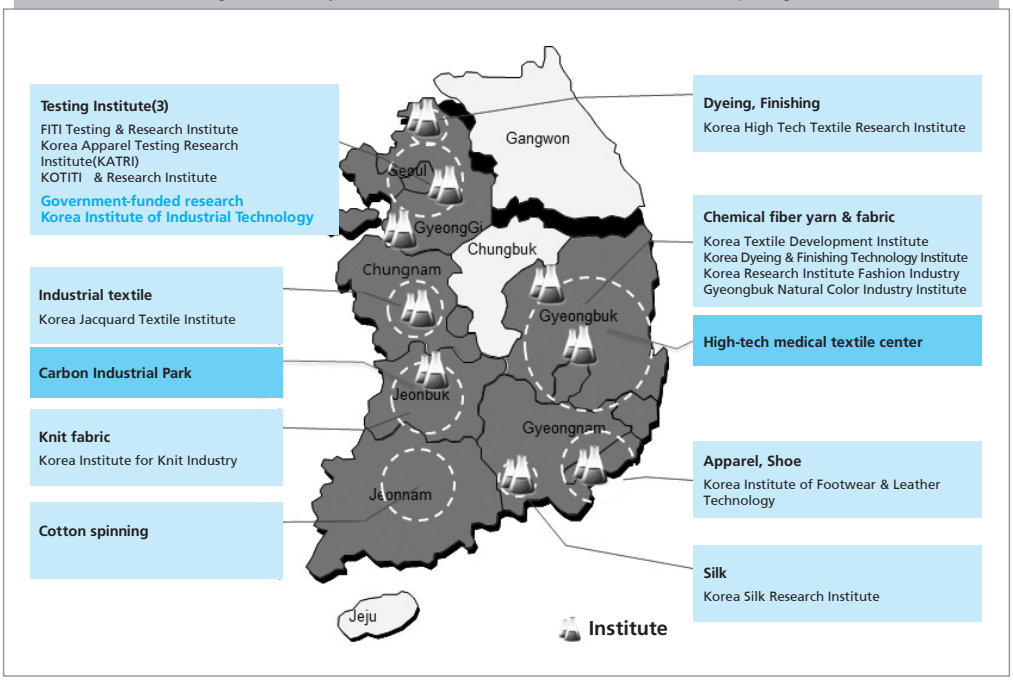
Source: KOFOTI (Korea Federation of Textile Industries), Textile Industry Status, http://www.kofoti.or.kr.

3.2. Establishment of Korean Textile Research and Testing Institute

Success factors of the Korean textile industry are abundant low-cost labor, manufacturing and textile industry promotion policies from the Korean government, and increased export scale by strategic transition from import replacement to export oriented in the 1960s. This was followed by quality development through promotion/technology/design development from the textile industrial complex in the 1980s, and promotion of technical competitiveness improvement through continuous expansion in R&D investment, product

discrimination, and high-value-adding since the 1990s.

[Figure 2-7] Specialized Textile Research Institutions by Region



Source: Compiled by the Author.

In addition, the KOTITI Testing & Research Institute in 1963, Korea Apparel Testing & Research Institute in 1964, and FITI Testing & Research Institute in 1969 were founded to promote the quality inspection of the textile export products. They conducted testing and inspection for the export products, quality assurance, mutually certified global certification, standardization, and education and training. Starting with the foundation of the Korea Textile Development Institute (KTDI) in 1977 at the center of the synthetic fiber production complex of Daegu as a starter, for promotion of the small & medium companies & R&D activities, the Korean government established 9 different textile-related research institutes on the Korean Peninsula with help from the Korea Institute of Industrial Technology (KITECH) and focusing on local textile production areas to do troubleshooting, R&D, HR training, basic pilot research, etc. The textile research institutes are in Daegu/Gyeongbuk (Synthetic fiber, weaving), Gyeonggi (Knitting), Seoul (Apparel), Chungcheong (Technical textile), Jeonbuk (Knitting), Busan (Shoes), and Jinju (Silk). Each is specialized in items produced from the respective locals and promoting its role with new materials development and high-value-added technology development through cooperation between the industries (Choi, 2013).

In addition, institutes and academia from the major production sites are operating customized local HR training programs specialized in local industry through the current infrastructure utilization. For example, to improve the global competitiveness of the textile industry through customized global HR with innovative capacity training, customized local HR training programs matching with local products are provided, including apparel/fashion HR training in Seoul, knit dyeing/finishing HR training in Gyeonggi, synthetic fiber oriented HR training in Daegu, etc.

〈Table 2-10〉 Non-regular Government Supported HR Training Programs

Titles	Training contents	Subject	Period	Memo
Practicum for Textile Major Students	Hands-on practice for the students at the production site	Textile Fashion Major Students	1week	Theory+ Practice
CEO Lecture for Students	Textile Fashion CEO Invitation Lecture	Students	1day	Theory
Technical Textile HR Training	Super textile & hybrid textile HR training	Master/PhD	1year	Theory+ Practice
Global Production Site Manager Training	Overseas production site manager training	Unemployed	6months	Theory+ Practice
Textile Exports Specialists Training	Exports, trade specialists training	Unemployed	5months	Theory
Textile Fashion Foundation Training	Textile basic, fashion basic, trade basic, dyeing basic, etc.	Employed	1week	Theory
Textile Fashion Advanced Training	Fashion marketing, trend analysis, trade advanced, weaving/knitting design, etc.	Employed	1week	Theory+ Practice

Source: KOFOTI (Korea Federation of Textile Industries), Textile Industry Status, http://www.kofoti.or.kr.

3.3. Korean Textile Industry Status

3.3.1. Overseas Investment of Korea

〈Table 2-11〉 Overseas Investment Status of Korea

(Unit: ea, $1,000, %)

Ranks	Country	Textile Fashion Industry			
		New Corporation		Investment Amount	
			Weight		Weight
-	Total Amount	5,676	100.0	8,206,482	100.0
1	China	3,260	57.4	2,566,329	31.3
2	Vietnam	754	13.3	1,995,134	24.3
3	Indonesia	318	5.6	978,760	11.9
4	US	366	6.4	495,497	6.0
5	Uzbekistan	26	0.5	214,168	2.6
6	UK	6	0.1	163,851	2.0
7	Switzerland	1	0.0	160,382	2.0
8	Bangladesh	92	1.6	160,356	2.0
9	Germany	4	0.1	150,570	1.8
10	Cambodia	73	1.3	119,182	1.5

Note: Total amount is accumulated amount from 1968 to Sep, 2016.
Source: EXIM Bank of Korea (Export-Import Bank of Korea), Foreign Investment Statistics, http://www.kita.org.

Regarding overseas investment status of Korea, more than 50% is from China and Vietnam. Recently, overseas investment has been expanded to Vietnam and Indonesia; however the investment in China has been decreasing continuously, and it has decreased 50% compared with 2015. Vietnam contributed 45% of the total overseas investment, and Indonesia 14%.

- Vietnam Textile Apparel Industry Investment Status of Korea

〈Table 2-12〉 Vietnam Textile/Apparel Industry Investment Status of Korea

(Unit: ea, $1,000, %)

Division	New Corporations(ea)		Investment Amount ($1,000)	
		Weight (%)		Weight (%)
Manufacturing	2,785	100.0	8,703,857	100.0
Textile/Apparel	754	27.1	1,995,134	22.9
- Textile	293	10.5	798,157	9.2
- Apparel	452	16.2	1,155,322	13.3
- Synthetic	9	0.3	41,655	0.5

Source: Compiled by the Author.

Based on the cumulative criterion in Sep. of 2016, Investment scale in Vietnam is expanded with 754 new corporations and reached 2 billion USD. With textile industry in the center, investment in Vietnam has increased since the establishment of diplomatic relations between the two countries and after the successful Bilateral Trade Agreement between Vietnam and the US in 2001. Investment by the Korean apparel industry into Vietnam has increased due to the expectation of increasing apparel exports to the US.

Especially, investment from the Korean textile materials industry in Vietnam has increased to secure the privilege over the recent Trans Pacific Partnership. However, Donald Trump, the president of USA, has publicly mentioned withdrawal from TPP; therefore, the investment in Vietnam has been expected to be reconsidered at the moment.

3.3.2. Trade Status of Korea

〈Table 2-13〉 Textile Products Exports Status & Partner Countries

Item	Amount ($, Mil.)					
	2015			2016		
	Amount	Weight	Variation (%)	Amount	Weight	Variation (%)
Total Amount	14,304	100.0	-10.2	13,651	100.0	-4.6
Textile Materials	1,188	8.3	-15.9	1,125	8.2	-5.3
Textile Yarn	1,461	10.2	-11.1	1,314	9.6	-10.1
Fabric	8,276	57.9	-10.6	7,821	57.3	-5.5
Textile Products	3,379	23.6	-6.6	3,391	24.8	0.3
Country	Amount ($, Mil.)					
	2015			2016		
	Amount	Weight	Variation (%)	Amount	Weight	Variation (%)
Total Amount	14,304	100.0	-10.2	13,991	100.0	-2.2
Vietnam	2,687	18.8	-1.7	2,833	20.2	5.4
China	2,221	15.5	-11.7	2,097	15.0	-5.6
US	1,371	9.6	-4.3	1,304	9.3	-4.9
Japan	745	5.2	-14.0	783	5.6	5.1
ASEAN	4,902	34.3	-6.4	4,929	35.2	0.6
EU	1,329	9.3	-13.5	1,310	9.4	-1.4
Middle East	911	6.4	-17.4	735	5.3	-19.3

Source: WITS (World Integrated Trade Solution), World Textiles and Clothing Exports by Country and Region 2014, http://wits.worldbank.org.

Textile exports of Korea in 2016 decreased 4.6% compared to 2015 and recorded 13.6 billion USD. This contributed 2.8% of total Korean exports in 2016 (495.5 billion USD). The reason for the decrease is the continuous decrease of textile material exports due to the late economic recovery of advanced countries, decrease in demand from China, and products price drop due to competition in the market.

In the status of major export partner countries, there was continuous decrease in China, US, and EU; however, exports to Vietnam and Japan increased.

〈Table 2-14〉 Textile Products Imports Status & Partner Countries

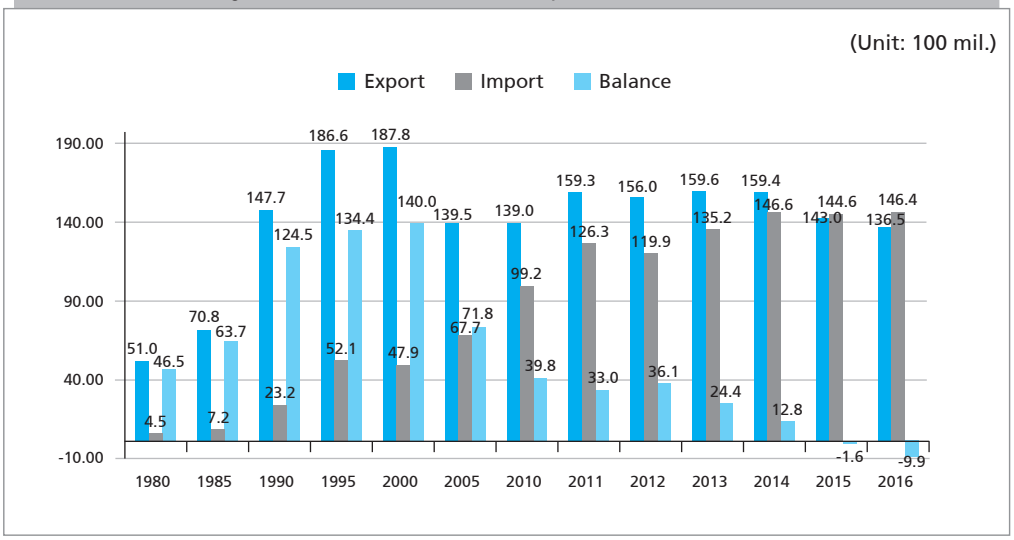
Item	Amount ($, Mil.)					
	2015			2016		
	Amount	Weight	Variation (%)	Amount	Weight	Variation (%)
Total Amount	14,461	100.0	-1.3	14,639	100	1.2
Textile Materials	192	1.3	-14.0	203	1.4	5.7
Textile Yarn	1,914	13.2	-8.5	1,862	12.7	-2.7
Fabric	1,853	12.8	-0.7	1,838	12.6	-0.8
Textile Products	10,503	72.6	0.2	10,736	73.3	2.2
Country	Amount ($, Mil.)					
	2015			2016		
	Amount	Weight	Variation (%)	Amount	Weight	Variation (%)
Total Amount	14,461	100.0	-1.3	16,659	100.0	15.2
Vietnam	2,838	19.6	2.9	3,136	18.8	10.5
China	6,451	44.6	-2.2	6,334	38.0	-1.8
US	346	2.4	-5.8	313	1.9	-9.5
Japan	398	2.8	-6.6	429	2.6	8.0
ASEAN	4,590	31.7	-0.7	4,878	29.3	6.3
EU	1,429	9.9	-0.3	1,477	8.9	3.4
Middle East	64	0.4	4.5	92	0.6	43.7

Source: WITS (World Integrated Trade Solution), World Textiles and Clothing Exports by Country and Region 2014, http://wits.worldbank.org.

In 2016, the total amount of Korean textile imports increased 1.2% compared to 2015, totaling 14.6 billion USD, and the trade balance recorded deficit of 990 million USD. This contributed 3.6% to the total amount of imports (406.1 billion USD) in 2016. Although, textile material consumption decreased due to the stagnant domestic market, the total amount of textile imports increased mainly due to increased apparel imports because of expanded overseas production.

The export to the major importing countries for the Korean textile industry increased significantly from South East Asian countries due to the expansion of the production into the region and also for the EU, but it decreased continuously in the last year for China.

[Figure 2-8] Korean Textile Industry Trade Status & Variation



Source: KOFOTI (Korea Federation of Textile Industries), 2017 Textile Import and Export Performance, http://www.kofoti.or.kr/OpBoard/View.asp?Code=STATISTICS&Uid=282.

According to the Korean textile industry trade status and variation, there was rapid increase in the export amount from 1980 until 2000, but it has continuously decreased ever since, and recently recorded trade deficit has been recorder.

3.3.3. Korean Textile Production Status

Korean textile production currently faces a serious stagnant economy and slowdown of exports, and also continuous expansion in overseas production. Therefore, slowdown on the production index is expected to be prolonged. Because of the same reason and decreased orders, production activities of weaving, knitting, dyeing/finishing, etc. also have been seriously reduced.

Overseas production is expected to continue to expand mainly on general products such as sewing clothes and apparel fabrics due to price cuts as global competition intensifies.. Since the management conditions in China, including growing labor costs, getting lack labor, etc., have gotten worse, trends of desensitization of production facilities and moving into South East Asian countries are set to persist.

• Korean Cotton Production Status

The cotton spinning business produces spinning yarn with filaments including cotton, polyester staple fiber, acrylic staple fiber, and as acts as an intermediary between the textile industries by providing intermediary materials to the textile products industry that produce fabrics, dyeing/finishing, and apparel.

Modernization of the Korean textile industry started with the foundation of Chosun Spinning in 1917 and Kyungsung Spinning in 1919, which were equipped with modern industrial systems. After the liberalization in 1945, those companies had a significant scale of spinning facilities (337,000 spinning machines, 9,000 weaving machines) and provided seed money for the development of the textile industry. Especially, between the 1960s and 1980s, this achieved quantitative growth with broad scale of facility investment to the textile materials industries followed by the demand increase of cotton yarn and fabrics as intermediary materials for the increased apparel exports.

Since the 1990s, the rapid increase in labor costs, the growth of competing countries, and the hollowing of the garment industry have continued to reduce demand in Korea. As a result, we have tried to improve our production, and production activities have been shrinking due to accelerated transfer of overseas production bases and reduction of spinning facilities.

〈Table 2-15〉 Korean Spinning Facilities Investment (2015)

(Unit: 1,000ea)

Section	2014		2015		Variation
		Weight('14)		Weight('15)	
Domestic	1,233	78.7%	1,112	67.0%	-121
Overseas	334	21.3%	547	33.0%	213
Total	1,567	100.0%	1,659	100.0%	92

Source: SWAK (Spinners & Weavers Association of Korea), Cotton Related Statistics 2015, http://www.swak.org.

Domestic facility investment decreased from about 9.8% from 1.23 million machines in 2014 to 1.11 million machines in 2015. Therefore, production of spinning yarn decreased from about 9.2% from 271,000 tons to 246,000 tons in the same period. However, overseas facilities increased by 21.3% in 2014 and by 33.0% in 2015.

• Korean Synthetic Fiber Production Status

The synthetic fiber industry is a capital intensive industry with high facility investment cost. With the trend of moving its major production sites to emerging Asian countries, China stands in the position of greatest strength as the largest country in terms of production and consumption. Therefore, the Korean synthetic fiber industry decreased production scale due to the severe competition and production facility expansion of China and other rival countries.

Polyester, as one of major synthetic fibers, has an important position in market share, contributing 80% of total synthetic fibers production. Especially, it is applicable not only in apparel but also non-apparel industries, so it has started to replace nylon and other synthetic fibers. Therefore it's been maintaining its relatively rapid growth rate. Polyester is divided into two different kinds: mono filament made into a long fiber without cutting, known as Filament Yarn, and filament bunch, made like cotton wool, known as Polyester Stable Fiber.

〈Table 2-16〉 Domestic Production & Imports Status

(Unit: 1,000ton, %)

Section	2011	2012	2013	2014	2015	Variation
Domestic	1,475	1,472	1,458	1,367	1,340	-2.0
Polyester	1,293	1,293	1,275	1,202	1,189	-1.1
Nylon	135	132	128	115	107	-7.0
Acryl	47	47	55	50	44	-12.0
Imports	**319**	**295**	**340**	**421**	**423**	**0.6**
China	131	131	146	183	195	6.4
Malaysia	37	33	46	58	46	-20.2
India	8	6	11	33	34	4.6
Japan	14	13	19	22	23	2.1

Source: KCFA (Korea Chemical Fibers Association), Domestic Production & Imports Status 2015, http://www.kcfa.or.kr.

Domestic production of polyester, nylon, acrylic, etc. have been decreasing slowly and imports of them from China, India, Japan, etc. have increased continuously.

〈Table 2-17〉 Global Polyester Production is very Competitive due to Oversupply

(Unit: thousand tons, %)

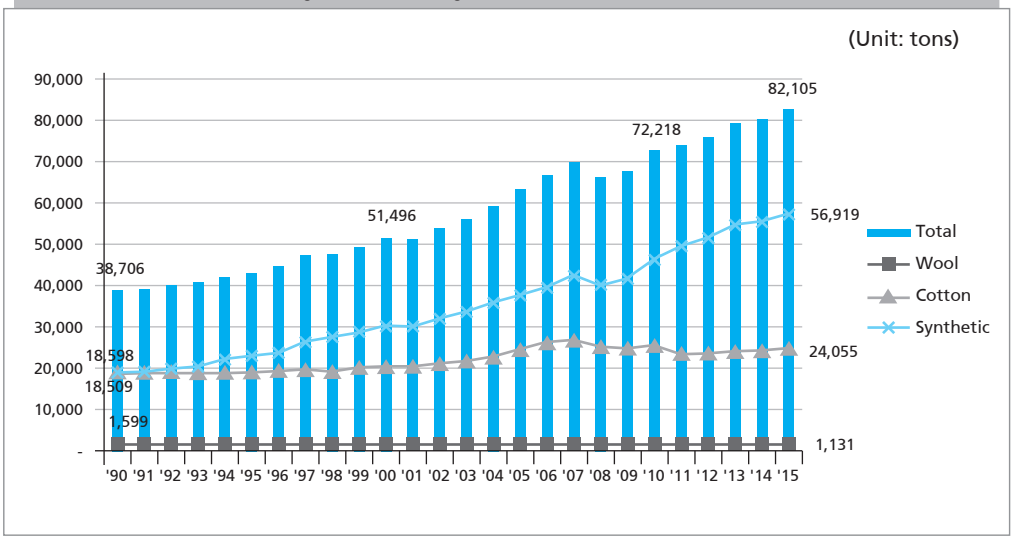
Country	PET	%	Nylon	%	Acryl	%	Etc.	%	Total	%
World	52,112	100.0	4,503	100.0	1,804	100.0	1,062	100.0	59,481	100.0
West Europe	454	0.9	280	6.2	202	11.2	63	5.9	999	1.7
East Europe	262	0.5	141	3.1	41	2.3	3	0.3	447	0.8
Turkey	488	0.9	78	1.7	281	15.6	15	1.4	862	1.4
Canada	1	0	82	1.8	-	-	-	-	84	0.1
USA	1,283	2.5	558	12.4	-	-	120	11.3	1,960	3.3
Mexico	146	0.3	19	0.4	51	2.8	6	0.6	223	0.4
Other Americas	273	0.5	62	1.4	33	1.8	20	1.9	388	0.7
Japan	266	0.5	91	2.0	147	8.1	57	5.4	561	0.9
China	37,477	71.9	2,369	52.6	703	38.9	693	65.2	41,242	69.3
Korea	1,518	2.9	133	3.0	48	2.7	37	3.5	1,736	2.9
Taiwan	1,448	2.8	323	7.2	55	3.0	20	1.9	1,845	3.1
India	4,533	8.7	104	2.3	101	5.6	8	0.8	4,747	8.0
Other Asia	3,537	6.8	181	4.0	108	6.0	20	1.9	3,845	6.5
Other Areas*	425	0.8	83	1.8	35	1.9	-	-	543	0.9

Note: Other Areas: Middle East, Africa, and Oceania.

Source: FEB (Fiber Economics Bureau), Fiber Organon, Monthly Production, Domestic Shipments, Exports, and Stocks for Major Generic Fibers 2015, http://www.fibersource.com.

In terms of polyester production in the global market, China, Korea, Taiwan, India, contribute 86.3% of the market share.

[Figure 2-9] Changes of World Textile Demand



Source: KOFOTI (Korea Federation of Textile Industries), 2017 World Textile Market Outlook, http://www.kofoti.or.kr/OpBoard/View.asp?Code=globalmarket&Page=4&Uid=623.

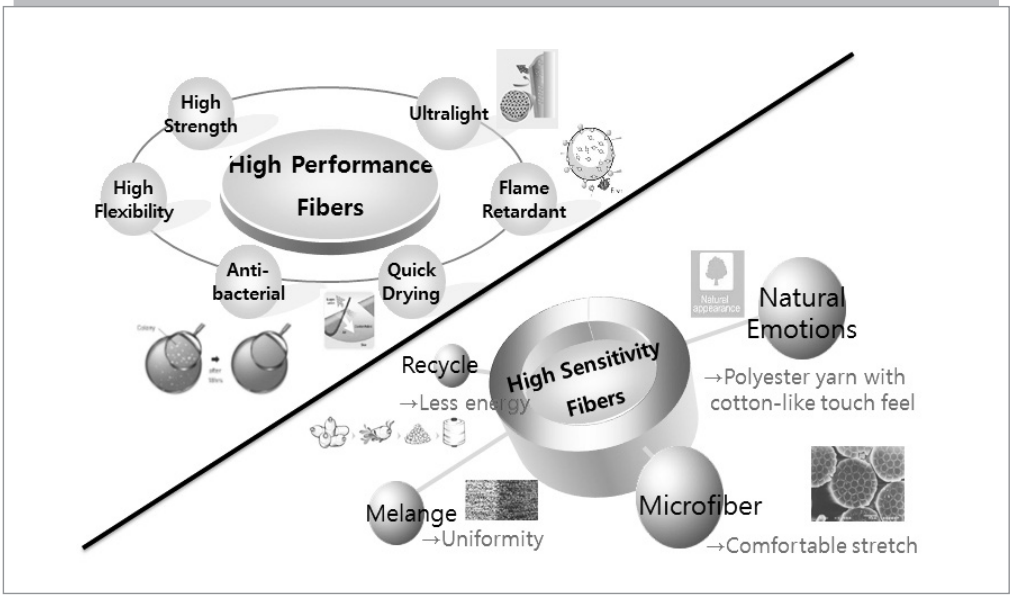
In 2015, global textile consumption was 82,105 tons. Synthetic fibers shared about 69.3% of this, and since 1990, annual average growth rates were recorded as synthetic fiber (4.6%), cotton (1.1%), and lamb wool (-1.4%).

3.3.4. Korean Technology Development Status

• Korean Textile Technology Development Status

Recently, the Korean textile industry has focused on the diversification and high-value-added productions through the new materials development & convergence between the industries. The textile technology with high performance & functions is being expanded in its applications as key materials to the transportation industry in electronics, electrics, aero planes, automobiles, and to the defense industry. Normally regular synthetic textile has low value, but these extreme performance textiles create much higher value.

[Figure 2-10] Korean Textile Technology Development Status



Source: Compiled by the Author.

The Korean textile industry is very much interested in high-performance and -functions textiles. However, related technology level is lower than the US, Japan, etc., and R&D funding and facilities investment have almost been caught up to by late-movers, including China. The Korean textile industry does have competitive technology in certain items—for example tire cords—, but generally its technology level is about 65% compared to those of advanced countries.

Therefore, the Korean government has put its efforts into the promotion of technology development through about 140 R&D subjects development with a supporting fund of about 2 billion KRW for 10 years into the three major sectors of super textiles, smart textiles, and eco textiles.

• Global Textile Technology Development Status

The global textile industry is transforming into a knowledge industry with application of technology, culture, and information. It has been changed into a value-adding industry with design, fashion, technology, marketing, etc. and focusing on high quality products for medical textiles and high-value-added products for technical textiles. Thus, the Korean textile industry will pursue its growth through synthetic textiles rather than focusing on the natural fibers with limited potentials.

The future textile industry is focusing on R&D of super light/high performance

textiles, smart textiles, environmental friendly textiles, medical textiles, etc. In addition, it is expected to have new sensibility textiles made of current textile materials through the finishing process for the application into environment, medical, health, silver industry, etc.

- Textiles for Clothing

It has become important to strengthen the image of various functions and human/environment friendly products. The growth in the sports and leisure sectors is becoming distinctive and is also expected to grow continuously with a high quality products strategy thanks to development of various performance materials.

- Textiles for Living

These are focusing on high sensitivity and high value-added interior products that can satisfy new needs of consumers. . Due to changes in perception of existing household goods, it is necessary to develop various products utilizing new functionality and environmentally friendly materials. and with new functions given the change of perception towards current living products.

- Technical Textiles

Drastic demand increase is expected due to the development of automobile, construction, IT, etc., along with the conversion of use. Carbon fiber and Aramid textile are rapidly replacing the metals in components of advance technology and becoming key materials. Currently other advanced countries are focusing on the related technology development: original technical textile technology in the US, extreme textile and composite finishing technology in Japan, and design and commercialization in the EU.

〈Table 2-18〉 Global Textile Technology Status

Division	Mid 90s	After Mid 90s	21C Textile Technology
Technology Direction	Productivity improvement through high-speed production & automation	IT technology development & quick response technology demand on the rise	Human & environment convergence
Development & Effect	Various kinds with small productions to meet customer demands	Various kinds with mass production technology demand increased to achieve products diversification & cost reduction	High-value-adding textile industry development with appearance of convergence textiles for performance & medical, etc.

Source: KOFOTI (Korea Federation of Textile Industries), Textile Industry Status, http://www.kofoti.or.kr.

4. Conclusions and Policy Proposal

• Advantage & Drawback of Ethiopian textile industry is shown as below

〈Table 2-19〉 Ethiopian Textile Industry Advantages and Drawbacks

Advantage	
Low Production Costs & Labors	- Enormous Local Cotton Production Potential (Organic) - Abundant Low Cost Labor - Low Lease Expenses Including Industrial Zones, etc.
Friendly Policy Environment	- Industrial Development Friendly GTP - A Member of COMESA - AGOA & EBA Beneficiary Country - Relatively Stable Political Environment in Africa
Logistics	- Good Weather & Environment Conditions for Cotton Farming - Vast Farming Areas - Growing Domestic Market & Neighboring Market - Close to EU, Middle East, India, etc. - Stable & Low Cost Electricity & Water Supply
Drawback	
High Logistic Costs	- High Transportation Costs - Complicated Custom Processes with Long Transportation Cycle
Low Value Added	- Obsolete Production Facility - Lack of Textile Finishing Technology & HR - Low Recognition of Costs Control & Lack of Incentives - Low Recognition of Quality & Design - Small Scale of Domestic Market
Less-Developed Related Industry	- Weak Local Related Parts & Materials Industry - Unstable Supply Cycle - Poor Road Conditions
Management Difficulties	- Poor Communication Infrastructure - Low Capacity in Finance, Marketing, etc. - Slow & Non-transparent Public Administration

Source: KITECH (Korea Institute of Industrial Technology), Korea-Ethiopia Textile Technology Cooperation Project Performance Report, 2013.

The Ethiopian textile industry should move into high-value-adding sectors with technology capacity improvement. In order to do so, for a short term strategy, Ethiopian textile industry should attract FDI companies for securing and accumulating the capital and the technology needed to overcome the weaknesses then should focus on the sustainability of the industrial development (Korea Textile Industry Association International Trade Team, 2012).

It is necessary to implement HR training programs & technical support programs to the production sites first with the optimal textile technology cooperation plan for the Ethiopian textile industry after thorough analysis of the surveyed Ethiopian textile industry status.

Technical support programs should include as many companies as possible and should be based on a long-term support plan with several stages through the analysis of Ethiopian textile technology level (KITECH, 2013).

Through the database establishment with textile-industry-related information of the two countries, it is also important to promote the exchanges between the companies, academia, and institutes from the two countries by continuous technical support, information exchange, and HR dispatches.

It is required to provide the technology transfer based on efficiency for the Ethiopian textile industry and to improve the technical supports for the development of general technology therein. In addition, through the actual necessary technology transfer, it is required to promote the vitalized exchanges of the textile technology between the two countries and to improve the industrial competitiveness of the Ethiopian textile industry (Korea Development Institute and Dohwa Engineering, 2014.)

With established networking between experts and institutes from the two countries, various related information regarding Ethiopian industries should be accumulated and also be provided to the domestic companies. This is important to ensure that those efforts do not end in the database but rather are presented as actual action plans in cooperation with government-led programs (KIIT, 2013).

4.1. Current Industry Structure Development

Ethiopia is currently considered as one of the emerging countries for new production sites, with logistic advantage and custom benefits from the US and EU. However, the Ethiopian government is currently still struggling with employment rate and exports targets due to the low technology, low capital, low productivity, and low quality in the domestic industry. East African countries are paying close observation to the induced employment effects of the textile industry, and they need immediate solutions to compete for attracting FDI companies (Tang, 2014).

In order for the Ethiopian textile industry to improve its current situation, it is critical to enter the high value adding sectors by developing the current industry structure, rather than maintaining the low production costs. Even from the experience of the Korean textile industry in the past, which had a similar situation

at that time, the Korean government implemented a similar strategy to develop the current structure.

〈Table 2-20〉 Similarities and Differences between Korean and Ethiopian Textile Industries

Similarities	Difference
- Transfer from domestic market to exports - High growth rate through FDI companies based on the low-cost labor - Low-value-added production-oriented industrial structure - Opened to extreme competition	- In the 1980s, Korea started to lose the benefits of low-cost labor, but in the Ethiopian case, low-cost production is the current key competition factor. - In the 1980s, Korea lost the custom benefits completely, but currently Ethiopia still has the AGOA, EBA, etc. from the advanced importing countries.

Source: KITECH (Korea Institute of Industrial Technology), Korea-Ethiopia Textile Technology Cooperation Project Performance Report, 2013.

• Current Cotton Industry Structure Development

- Cotton Grading System Establishment required
- Replacement of obsolete machinery implementation (Government Support Policy)
- Strengthening the relationship between the streams and technology development
- Ginning, spinning, weaving/knitting technology development
- Strengthening middle-stream (dyeing/finishing) to provide high-value-adding to the textile products

In order for the cotton textile industry to have productivity improvement, a cotton grading system, and quality improvement, the Korean government implemented the policies to replace the obsolete equipment and promoted dyeing/finishing industries as a part of the textile industry structure development program in the 1980s. The Ethiopian government is also required to implement such policies to develop the structure of the Ethiopian textile industry.

• Policy Implications and Conclusions based on Korean Experiences

〈Table 2-21〉 Status of CMT Orders in Vietnam/ Ethiopia

Division		Vietnam	Ethiopia
Product Price		100%	80%
Labor Cost		about 200$	about 60$
Subsidiary (Local sourcing)		80%	-
Fabric (Local sourcing)		21%	-
Clothing Productivity	Basic	100%	30–50%
	Jumper	100%	under 30%
Quality	Basic	100%	80%
	Jumper	100%	under 50%
Delivery Time (Air)		1 month	3–5 month

* Delivery Time (From the point of materials and parts received): Korean supply standard.
Source: Compiled by the Author.

It is difficult for Ethiopian industry to export sewing products by CMT orders, because all parts and materials are imported from overseas. Although Vietnam is also importing 80% of materials and parts from overseas for their CMT order, a short-term supply cycle is possible due to the closer locations of the import sources located in the neighboring countries, and also the quality of the sewing products are relatively better that surrounding countries. In the case of Vietnam, many sewing companies invested first and established the vertical production system later, then purchased the necessary fabrics from the local sources.

In the result, the Ethiopian textile industry has absolute advantages in terms of the product price & low labor costs; however, other than those, it does not have very good advantages against Vietnam. Especially, in order for the Ethiopian textile industry to have better quality and delivery time, it is recommended to analyze the streams in depth to enable development of the value-adding system necessary to attract FDI sewing companies.

• Ethiopian Textile Industry Challenges

It is required to improve the supply system for the materials and parts & working environments according the experts' advice to manage the materials and parts quality. It is better planned for the long term with stages rather than the short term. The Ethiopian government should avoid supplying more than demand of the current job market with non-experienced laborers through the currently outnumbered technical and polytechnic institutes. Rather it should reduce the number of institutes and converge into one institute each for respective areas

and connect them with local industries. They could then provide the intensive and structured training programs customized for supplying field engineers and laborers. It is also necessary to adopt the structured management system and technology to provide the global standard specifications and qualities rather than insisting on the conventional methods

Especially in the field of sewing, there are strict criteria for delivery date in the international market. At present, most of the traditional management systems used by Ethiopian public corporations and private companies have limited development.

4.2. Diversification of Synthetic Fibers

- Various Textile Products Development with Synthetic Fibers

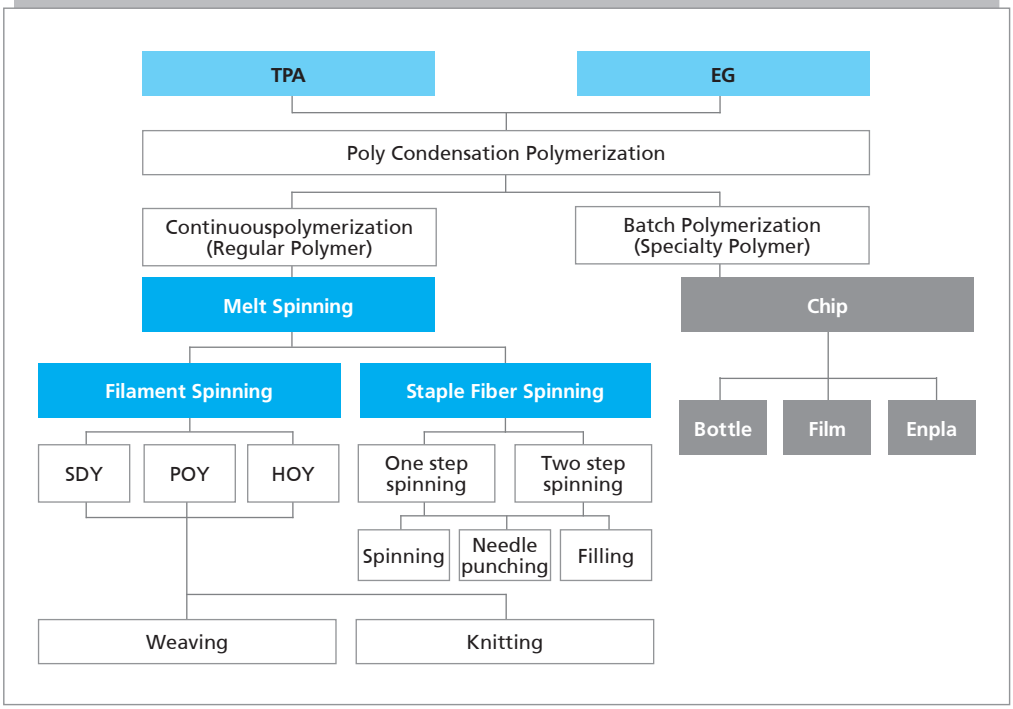
- Textile materials diversifications through strengthening up/middle-stream competitiveness
- Active wear development with application of synthetic fiber yarns
- Export market expansion through diversification of textile materials

There are limited opportunities for current cotton or blended fabrics only in the high-value-added products market.

Since there is no foundation for polyester production in Ethiopia, it should focus on the technology development with various imported polyester yarns by utilizing the current facilities of weaving, knitting, and dyeing/finishing. It should then focus on not only blended fabrics but also union cloth for the development of various products.

Although it is required to establish the polyester production facilities, Ethiopian industry is limited in its ability to do so due to non-existence of petro-chemical facilities. With imported polyester chips to produce the yarns for the productions, it requires careful approaches because of the quality and price competition in the global market.

[Figure 2-11] Schematic of Polyester Manufacturing Process



Source: Compiled by the Author.

Polyester is made by condensation and polymerization of medium materials between Ethylene Glycol (EG) and Terephthalic Acid (TPA) extracted from petroleum. Although, polyester started from the same petroleum, we can produce three different types of it by adding three different additives with different characteristics. These polyesters are called modified polyesters, and with them we are able to produce good quality fabrics in terms of stainability, flexibility, and hydrophilicity.

Depending on purpose, polyester can be (produced) through the spinning nozzles as filament yarn or staple yarn, or produced as chips to be used in making bottles, film, engineering plastics, etc. It is versatile and can be used in weaving, knitting, thick and thin products, etc.; therefore the production structure is considered to be very well balanced.

One of the characteristics of the polyester is that it has excellent blendability and it has a lot of blend with other fibers in addition to the 100% product. Especially staple fiber blends with other fibers and is excellent in spinning property. Therefore, a product is produced by blending natural fibers such as cotton, mohair, etc. with rayon and other synthetic fibers. The advantage of polyester blend fiber is that while making the features of both materials

False-twisting in polyester filaments is a way to provide crimps by applying twisting and de-twisting at the same time after initial twisting. The purpose of this process is to make its touch as close as possible to the natural fabrics and to apply crimps and bulking on the surface. It is distinguished by the speed of spinning and orientation level of the yarn.

〈Table 2-22〉 Classification of Melt Spinning by Orientation

Yarn classification	Speed (m/min)	Remarks
LOY (low oriented yarn)	500–1,500	Stretching and twisting process required
MOY (medium oriented yarn)	1,500–2,500	-
POY (partially oriented yarn)	2,500–4,000	POY-DTY production by stretching-flammable process
HOY (highly oriented yarn)	4,000–5,000	Spin draw (simultaneous process of low-speed spinning-drawing)
	6,000	HOY (high-speed spinning): omitting the drawing process
FOY (fully oriented yarn)	6,000 more	-

Source: Textile Processes, Polymer Processing-Spinning Process of Polymers, http://www.teonline.com.

UDY (undrawn yarn) is generally produced at a speed of 1,000 to 1,500 m/min, POY (Partially oriented yarn) of 3,000 to 4,000 m/min, and HOY (highly oriented yarn) of 6,000 m/min or more.

〈Table 2-23〉 Polyester Fiber Production Model & Investment

Filament Line

Model	Polymerization	Melt Spinning	Draw Texturing	Investment ($/ton per day)	Other
I	O	O	O	830,000	Standard
II	-	O	O	720,000	Chip outsourcing
III	-	-	O	380,000	POY outsourcing

Staple Fiber Line

Model	Polymerization	Melt Spinning	Crimp & Cutting	Investment ($/ton per day)	Other
I	O	O	O	510,000	Standard
II	-	O	O	400,000	Chip outsourcing
III	-	-	O	310,000	POY outsourcing

Source: Polyester Fiber Production, February 08, 2016, https://financialtribune.com and expert interview.

We estimate facility investment for PET fiber as follows (depending on local circumstances).

While all of the polymerization, spinning, and post-processing facilities are costly to invest, considering what is the priority of investment, Ethiopia can invest in each direction according to the situation of textile industry after-finishing-Post-Processing polymers-chips.

In the case of establishing only spinning and after-finishing process, these can be done with imported polymerized materials or established only facility and use imported filament and stable to produce. For Ethiopian industry, it should analyze the related factors comprehensively then choose the model for polyester production facility.

4.3. Established R&D Center

• Textile Sector R&D Center and HRD System Establishment
- Technology Independence through yarn/materials/apparel sector R&D
- R&D for convergence of advanced textile technology and Ethiopian textile resources (cotton, etc.)
- Textile stream pilot-plant establishment (weaving, knitting, dyeing & finishing,

sewing)
- Pilot product development and marketing vitalizations through pilot-plant
- Business incubation center (for textile-related companies)
- Technology competitiveness development through the cooperation with overseas partners
- Export diversifications through the new products development (expansion to Asia)
- High-value-added products development through professional HR training
- Industrial hub functions for high-value-adding include pilot products development, HR training, apparel/fashion, marketing, etc.

In the East African region, there are several similar industrial zone projects with similar economic structures benefiting from similar low-cost labor, low productivities, etc.; therefore the severe competition between the countries are in place. The Ethiopian government has established an industrial zone management company and put their efforts into vitalizing the system. However, it still needs complementation in system, management/operation, investment, etc. and in order to achieve the leading position, it needs to establish a long-term development direction.

The future growth engine for the textile industry is to connect the value chains between the streams for establishing the foundation to produce high-value-added products, along with HR training to supply research experts capable of working from the planning of the materials to the new products development. For this, the Ethiopian textile industry needs textile technology development institutes operating technical supports, HR professional training, pilot products development, apparel/fashion, marketing, etc. This can be realized through technical cooperation with overseas partner countries.

Currently, the Ethiopian textile industry export contribution to total exports is decreasing due to the obsolete facilities and management system along with a high rate of dependency on imported textile materials, low R&D capacity, lack of HRD systems, and lack of management capacity. In addition, there is no cotton production and management system, certificate and analysis system, logistics between the textile clusters, and no HRD systems (except technical training including management, marketing, QA, investment promotions, exhibitions, trade shows, etc.).

In order for the textile industry to prepare for global competitiveness, it is required to support small- and medium-sized companies with R&D for high-value-added production technology development through the cooperation between the companies and specialized new materials development for each item. By

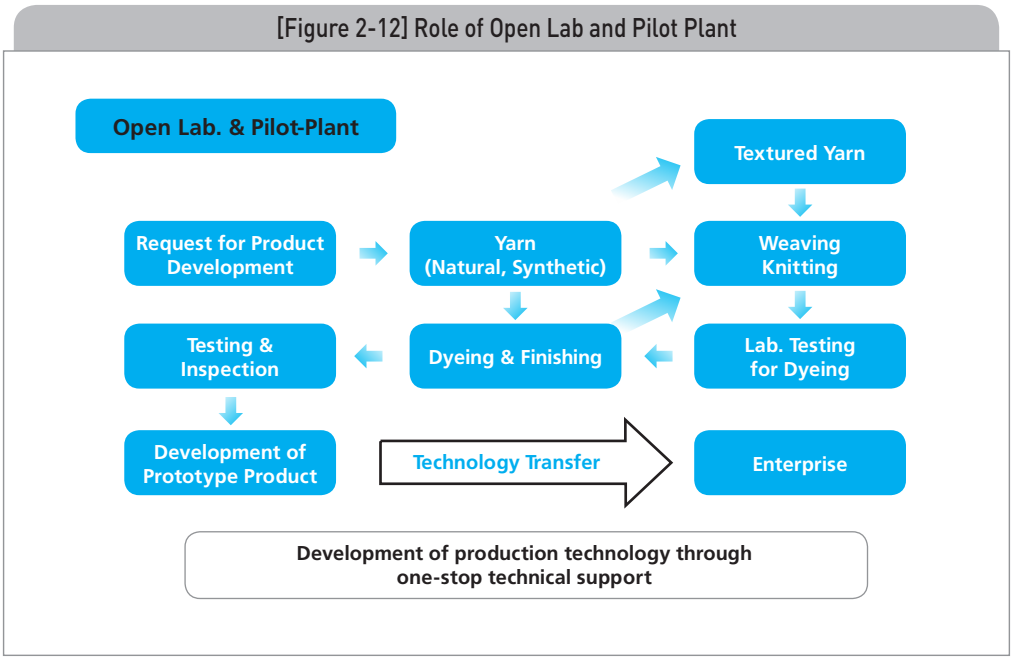
establishing industry/academia/research institutes for textile professional HR development, an efficient HR development plan matching with the current demand is required to tackle the unbalanced HR supply and provide experienced professionals to the industry.

Furthermore, the Ethiopian government should operate industry-oriented and localized HR training programs through the utilization of the current academia and research institutes in the regions to improve global competitiveness by the innovative and comprehensive convergence of the HR training programs.

If the Ethiopian textile industry could produce the high value added products through the value chain development in each stream, then it could have high potential for rapid economic growth. Even though it is urgent to train the professionals for each stream, there are no proper related training systems. Therefore, as Korean government did in the past, the Ethiopian government is required to organize the cooperation committee for HR development in textile sectors to promote the HR training system between government/industry/training institutes and, based on that, to establish localized HR training systems.

A textile R&D center shall support technical communities, business incubations, close-range support for the small- and medium-sized companies through commercialization, and textile industry technology development and transfer, etc.

[Figure 2-12] Role of Open Lab and Pilot Plant



Source: Compiled by the Author.

• Equipment List for Building R&D Center for Textiles

〈Table 2-24〉 List of Equipment for Establishing Textile R&D Center

Knitting Equipment List

Field	Section	Equipment
Knitting	Pilot	Single Circular Knitting M/C (24Gauge)
		Double Circular Knitting M/C (24Gauge)
		Computer Flat Knitting M/C (12Gauge)

Dyeing & Finishing Test & Lab. Equipment List

Field	Section	Equipment
Dyeing	Lab	Lab. IR Dyeing M/C
		Computer Color Matching and Computer Color Kitchen
		Dye-O-Meter
		Image Analyzer (Microscope)

Dyeing Equipment List

Field	Section	Equipment
Dyeing	Pilot (Dip Dyeing)	Vertical Winch Dyeing M/C (20,30kg)
		High Pressure Rapid Dyeing M/C (20,50kg)
		Atmospheric Jigger Dyeing M/C
		Low Liquor Ratio Dyeing M/C
		Hank Dyeing M/C
		Garment Dyeing M/C
		Main Control System for Dyeing Factory
		Dye Solution and Transfer System (Dye stuff Dissolving System)
		Chemical Solution and Transfer System
		Opening Machine
		Tumble Dryer
		Centrifugal Hydro-extractor
		Fabric Inspection Rolling M/C
		Industrial Sewing Machine
		Industrial Balance
		Net Dry M/C
	Pilot (Printing)	Digital Textile Printing System

Sewing/Apparel Equipment List

Field	Section	Equipment
Pattern	-	Pattern Cad System (5set)

〈Table 2-24〉 Continued

Test/Analysis Equipment List

Field	Section	Equipment
Fastness	Fastness Test	Launder-O-Meter
		Fade-O-Meter (Xenon)
		Electronics Crock Meter
		Tensile Strength Tester
		ICI box Pilling Tester (ISO)

Evaluation/Certification Equipment List

Field	Section	Equipment
Evaluation/ Certification	Lab	UV-Visible Spectro Meter
		Scanning Electron Microscope/Microtome

Finishing Equipment List

Field	Section	Equipment
Finishing	Lab	Automatic Mangle
		Heat Setter for Finishing
		Labtenter
	Pilot	S-Tenter System (6-chamber)
		Open Compact M/C
	Utility	Boiler for S-Tenter

Knitting Equipment List

Field	Section	Equipment
Knitting	Pilot	Single Circular Knitting M/C (24Gauge)
		Double Circular Knitting M/C (24Gauge)
		Computer Flat Knitting M/C (12Gauge)

Dyeing & Finishing Test & Lab. Equipment List

Field	Section	Equipment
Dyeing	Lab	Lab. IR Dyeing M/C
		Computer Color Matching and Computer Color Kitchen
		Dye-O-Meter
		Image Analyzer (Microscope)

Dyeing Equipment List

Field	Section	Equipment
Dyeing	Pilot (Dip Dyeing)	Vertical Winch Dyeing M/C (20,30kg)
		High Pressure Rapid Dyeing M/C (20,50kg)
		Atmospheric Jigger Dyeing M/C
		Low Liquor Ratio Dyeing M/C

〈Table 2-24〉 Continued

Dyeing Equipment List

Field	Section	Equipment
		Hank Dyeing M/C
		Garment Dyeing M/C
		Main Control System for Dyeing Factory
		Dye Solution and Transfer System (Dye stuff Dissolving System)
		Chemical Solution and Transfer System
		Opening Machine
		Tumble Dryer
		Centrifugal Hydro-extractor
		Fabric Inspection Rolling M/C
		Industrial Sewing Machine
		Industrial Balance
		Net Dry M/C
	Pilot(Printing)	Digital Textile Printing System

Sewing/Apparel Equipment List

Field	Section	Equipment
Pattern	-	Pattern Cad System(5set)

Test/Analysis Equipment List

Field	Section	Equipment
Fastness	Fastness Test	Launder-O-Meter
		Fade-O-Meter (Xenon)
		Electronics Crock Meter
		Tensile Strength Tester
		ICI box Pilling Tester (ISO)

Evaluation/Certification Equipment List

Field	Section	Equipment
Evaluation/ Certification	Lab	UV-Visible Spectro Meter
		Scanning Electron Microscope/Microtome

Finishing Equipment List

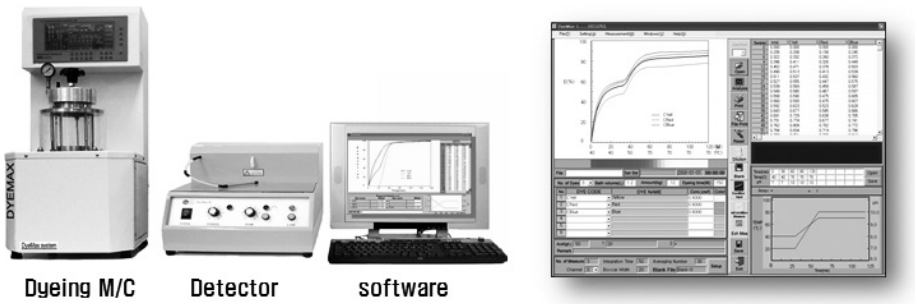
Field	Section	Equipment
Finishing	Lab	Automatic Mangle
		Heat Setter for Finishing
		Lab.Tenter
	Pilot	S-Tenter System(6-chamber)
		Open Compact M/C
	Utility	Boiler for S-Tenter

Source: Compiled by the Author.

[Figure 2-13] Field Emission Scanning Electron (FE SEM) system

Source: Compiled by the Author.

[Figure 2-14] Dye-o-meter System



Source: Compiled by the Author.

[Figure 2-15] Pilot Plant Image (Korea Institute of Industrial Technology)

Source: Compiled by the Author.

4.4. Established Test Certification Center

• Establishment of Global Level Testing & Inspection System Development

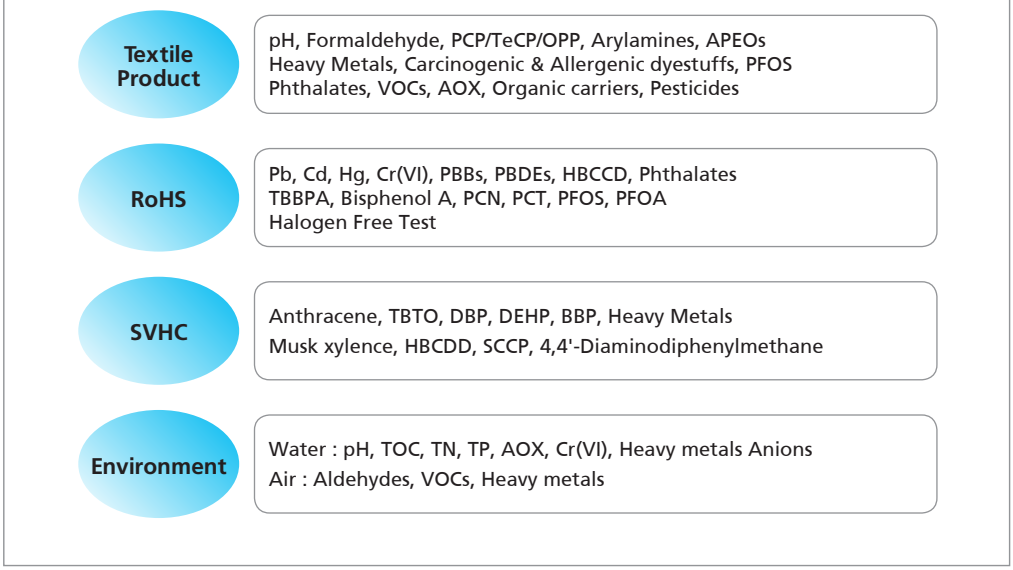
Ethiopia needs a textile/apparel testing & inspection center to provide the related services for textile, apparel, and leather certification service. This must be a global certified institute, which could contribute to the development of the Ethiopian textile industry structure. The quality inspection process contributes to the quality assurance of the final products as well as to the producers, suppliers, and buyers within the supply chain of the Ethiopian industry.

• Korean Testing/Inspection System Benchmarking

Korean testing/inspection systems are as below.

In case of open test and hazardous substance analysis, it provides fabric analysis, pilling test, fastness test (light, wind, washing, abrasion, etc.), shrinkage & shape management index, strength test (tensile, tearing, etc.), durability test, flammability test, etc.

[Figure 2-16] Open Test and Analysis of Hazardous Substances



Source: Compiled by the Author.

- General Quality Test (Fastness Evaluation)

This is a commonly practiced test on the apparel products with physical characteristics and dyeing fastness to evaluate washing fastness, tensile strength, tearing strength, and pilling test for checking the product quality.

- Hazardous Substance Analysis Test

Hazardous substance risks have increased due to the utilizations of various technologies and materials into the productions. Especially, for the vulnerable, including children, etc., it is known to harm the subject due to direct and indirect exposure to the hazardous substances. Therefore, governments and the apparel brands are fortifying the regulations of hazardous substances globally.

- Performance Test (Physical/Chemical Analysis)

Outdoor activities have been on the rise continuously over the years, with interest in the performance including fast absorption and fast dry, thermal retaining, etc. having increased significantly. Various performance tests can be provided for various textile products.

- Textile Products Quality Index Confirmation Test

This is used to confirm the index contents as it says and abide by the regulations to keep the general public safe and to verify the information regarding materials (textile composite, blend rate, etc.) and guidelines on the index. It is required to confirm and test for both domestic and export products.

• Mandatory Test/Inspection Regulations for Trade Products

- Domestic and export products quality test (Korea, China, US, Japan, EU, etc.)
- Fabric and parts test
- Test on logistics and large-quantity supply to department stores etc.
- Overseas buyers and global certification test
- Quality verification test required by the buyers
- Hazardous substance analysis test for export products
- National and group specifications (AATCC, ASTM, ISO, DIN, BS, etc.)

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Glossary

AATCC	American Association of Textile Chemists and Colorists
AGOA	African Growth & Opportunity Act
ASTM	American Society of Testing Materials
BS	British Standards
BT	Bio Technology
CIA	Central Intelligence Agency
CMT	Cut, Make and Trim
COMESA	Common Market for Eastern and Southern Africa
DIN	Deutsche Industric Normen
DTY	Draw Textured Yarn
EBA	Everything But Arms
EG	Ethylene Glycol
ERCA	Ethiopian Revenues and Customs Authority
ETB	Ethiopian Birr
EU	European Union
FDA	Food and Drug Administration
FDI	Foreign Direct Investment
FOY	Fully oriented yarn
GDP	Growth Domestic Product
GTP	Growth and Transformation Plan
HOY	Highly oriented yarn
HR	Human Resource
HRD	Human Resource Development
ICI	Imperial Chemical Industries PLC
IPDC	Industrial Parks Development Corporation
ISO	International Organization for Standardization
IT	Information Technology
KCFA	Korea Chemical Fibers Association
KITECH	Korea Institute of Industrial Technology
KOFOTI	Korea Federation of Textile Industries

KRW	Korea Republic Won
KTDI	Korea Textile Development Institute
LOY	Low oriented yarn
LTA	Long Term Arrangement
MFA	Multifiber Arrangement
MOI	Ministry of Industry
MOY	Medium Oriented Yarn
NT	Nano Technology
PET	Polyethylene Terephthalate
POY	Partially Oriented Yarn
PVA	Polyvinyl Alcohol
QA	Quality Assurance
R&D	Research and Development
RMG	Ready Made Garment
STA	Short Term Arrangement
SWAK	Spinners & Weavers Association of Korea
SWOT	Strength, Opportunity, Weakness and Threat
TPA	Terephthalic Acid
UNCTAD	United Nations Conference on Trade and Development
US	United States
USD	United States Dollar
USDA	U.S. Department of Agriculture
WTO	World Trade Organization

2016/17 Knowledge Sharing Program with Ethiopia:
Gearing up Ethiopia with Innovative Initiatives:
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Chapter 3

Establishment of Resilient and Inclusive Cities: Focusing on Land Registration

Establishment of Resilient and Inclusive Cities: Focusing on Land Registration

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Summary

Ethiopia is still among the least urbanized countries in the world. However, recently, the level of urbanization and urban development in this country has increased at an alarming rate. The urbanization growth rate in Ethiopia is about 5.4% per annum (World Bank, 2015) which is among the fastest urban growth rates in the world currently. When the Central Statistical Agency of Ethiopia predicted the urban population size of Ethiopian regions until 2037, the agency predicted the urban population of Oromia, Tigray, and SNNP will grow by 63%, while the Amhara region will see a 66% increase in its urban population. Similarly, Addis Ababa's urban population is expected to grow by about 30% by 2024. Factors that contribute to urbanization in Ethiopia are: improvements in infrastructure, rural-to-urban migration, expansion of industries, agro industries, and job opportunities. However, the pace of the population increase in urban areas and urban facilities do not match; thus, urban areas of the county are struggling with housing problems and other infrastructural facilities. In fact, there is high rural-to-urban migration, which in turn leads to growing housing and welfare problems.

For successful urbanization, a well-functioning and modernized land administration system is needed. For cities to provide public services that match the increasing urban population there needs to be a well-functioning market for land, among other things. Moreover, there is a need for engagement of the urban population in development and governance, which in turn enhances public

private partnerships and decentralizes administration to allow cities to be able to administer themselves. This requires creating stronger local capacity for cities to develop and manage urban infrastructure and services, and delivering them more effectively and efficiently. Land registration is one of the major elements in land administration and land policy. However, only a small proportion of urban land has legal cadaster in the country. Thus, effort must be made to modernize the land registration systems for the fast exchange of and access to land use and planning.

First, to successfully renew the land administration system, there is a need to understand the history of land policy in Ethiopia, which started in 1930. Ethiopia has passed three political administrations. These were: pre-1974 (mainly the imperial regime), the Derg regime (1974–1991) and the current government (EPRDF, since 1991). Under the first regime, the land holding system reveals that the king owned all of the land in the country. Other private agents (such as family and the church) derived their claim to the land from imperial land grants. During the imperial regime, private ownership of urban land was reemphasized by the Constitutions of 1931 and 1955 as well as the 1960 civil code. Up until the coming of the 1974 Ethiopian Revolution, landlords in different urban areas heavily invested in the development of housing for rent.

Starting in 1975, Derg, the second regime, was a military council comprised of representatives of the different armed forces in the country that had ousted the Imperial regime from power. In June of the same year, the government enacted a new law for the nationalization of urban land and extra rentable houses (Proclamation No. 41/75). Accordingly, all urban lands and extra houses of the wealthy urban dwellers were confiscated without any compensation.

In the current regime, land policy has been implemented in accordance with the constitution of the country. The Ethiopian Constitution in 1995 stated that all urban and rural land in Ethiopia is owned by the public. To make provisions for land use in this context, different proclamations have been issued since 2002, with revision to make the proclamations practical and fit to the changing environment.

Second, to successfully formulate the land information system, a study on Korean experiences can be very helpful, and policy suggestions to overcome Ethiopian land system challenges can be derived therefrom. Finally, the Ethiopian Land Information System can be reviewed on the basis of comparison with the Korean Land Information System.

The current urban land registration system in Ethiopia faces many challenges. Among the major challenges, the first is related to the legal framework; this is due to lack of any room for the private sector to engage in developing and

supplying urban land to users. This creates a government monopoly on urban land development and supply and hence is inefficient and more expensive. The second problem is related to the organizational capacity of land-related institutions; this is because the country only recently began to set up separate land registration institutions at federal and regional levels, which has created overlapping of duties, lack of modern technologies, and absence of a land information system. The third major challenge is financial constraints. Ethiopia is still a low-income country, which creates a major obstacle in meeting the country's desire to develop and modernize the land information system. To meet these challenges, the study forwarded policy solutions that were given as follows by reviewing Korean experiences.

Regarding the capacity challenge, reforming institutions and initiating collaboration with research institutes/universities are needed. Collaboration with institutions was successful for the establishment of the Korean land information system. Again, for the organizational structure and legal framework challenge, it is easy to solve because it is under the control of the government, and can be solved by reforming a new establishment, formulating a new law, or preparing a new procedure manual.

To solve financial constraints, emulating the financing of the Korean EDCF Program may be needed, in which Korea equally shared finances with the local government and the central government. However, to successfully solve the problem in the short-run, the central government should budget and take into consideration additional sources such as loan/grants from bilateral or multilateral agencies to finance the establishment of a land information system in the country. In the meantime, sustainable financial sources should be established through the creation of capacity-building for self-finance by introducing charges and fees from clients. This self-finance system should also be based on transparency in the tax system.

Finally, to set up an Ethiopian land information system, based on Korean experiences, a series of stepwise procedures are stated in the study. These steps are: Reforming existing organizational structure (from central to local) → Creating awareness (giving full information to the communities/institutions and for other stakeholders about land information system) → Taking pilot test (from land at the central and local level) → Applying land digitalization (by collecting all information about pilot land taken) → Doing evaluation (revising the above steps and designing steps to strengthen any drawbacks, and taking all necessary correction) → Reapplying land information (both at central and local levels by having all resources).

1. Introduction

1.1. Background

Ethiopia's land policy has evolved with the three different administrations that ruled Ethiopia since 1930, reflecting their political ideology. Even though the current government implemented a free market, the public owns all rural and urban land. The 1995 FDRE (Federal Democratic Republic of Ethiopia) Constitution, Art 40, states "all urban and rural land is the property of the state and the Ethiopian people." Proclamations were issued by the existing government for the provision of land use. A special proclamation, the Lease Holding of Urban Lands Proclamation No. 272/2002, governs urban land.

Though the level of urbanization and urban development in Ethiopia is still in its infancy, currently there is fast expansion in urban centers. For example, as of early 2014, it was estimated that only one-fifth of Ethiopia's population lived in urban centers, making the country as one of the least urbanized, even by sub-Saharan Africa standards. However, it has one of the highest annual urbanization rates, estimated at 4.1%, which is higher than the average of developing countries (MUDHCo, 2014). Increasing urbanization is being fueled by population density and growth rate, availability of commercial farms and agro industries, large infrastructure investments, and better job opportunities in industry and service sectors. These factors will continue to fuel urbanization and are expected to add 30 million more people to Ethiopia's cities by 2035. However, the pace of increase in population in urban areas is not in line with growth in urban infrastructure and other facilities, mainly housing. Among other things, cities need a well-functioning market for land transfer, so they spend the proceeds from public land transfer on provision of social services. However, a proper land market can only be ensured in the presence of legal land holding rights or legal cadaster. Currently, only a small proportion of urban land has legal cadaster.

To this end, the government has started a pilot legal cadaster program in 23 cities of Ethiopia, with the intention to scale up the implementation to cities nationwide. During the GTP2 and GTP3 period, the government plans to implement legal cadaster in 91 cities. This practice is supposed to modernize Ethiopia's land registration and administration process. Apparently, the implementation process faces various bottlenecks slowing down the progress. These include, among other things, legal framework, organizational capacity, finance, and disputes due to land expropriation.

It is, thus, imperative to identify those bottlenecks and indicate possible pathways for overcoming those challenges. One way to mitigate the hindrances

facing modernization of land registration is by adopting the best experiences from countries that have faced similar challenges to those facing Ethiopia today, but which managed to succeed in modernizing their land registration. Nowhere is this more evident than it is in the Republic of Korea. A little more than a half a century ago, before its industrialization, Korea was one of the poorest countries in the world. However, Korea is currently a high-income country with a per capita GDP of USD 34,549 (World Bank, 2015). A well-organized land registration system, among other factors, has fuelled Korea's economic development. In order to distribute the benefits of land equitably and achieve efficient use of land, Korea has set up various land policies and strategies over the years. Likewise, different national programs related to land have been undertaken. The "master plan for national GIS establishment" program, which was launched in 1995, led to the setting up of polices related to the establishment of geographic information infrastructure, including national base maps, cadaster maps, etc. Moreover, during the period 2006–2010, different policies were designed mainly to cope with rapidly changing information technology and to facilitate the creation and use of national- and municipal-level geospatial databases. Currently, Korea has one of the best land information systems and land administration system in the world. Thus, Ethiopia would benefit by adapting Korea's experience in its effort to modernize its own land registration system. The current study will thus highlight how Ethiopia can adopt Korea's best practices in its effort to do so.

The structure of this paper is as follows. Section 2 presents an overview of Ethiopian land policy and trends in urbanization over the past few decades. Section 3 discusses the challenges facing Ethiopia in its effort to modernize its land registration system. Section 4 provides possible pathways to overcome those challenges. Section5 highlights policy recommendations based on Korean experience. Section 6 discusses the establishment of the Ethiopian land information system (ELIS) by adapting Korean experience. Finally, chapter 7 concludes this study.

1.2. Objective

The goal of this paper is to classify the problems hindering the modernization of Ethiopia's land registration and administration system and recommend policy actions to overcome those bottlenecks, by learning from the Korean experience in modernizing its land registration system. Specifically, the project aims to do the following:

- Identify bottlenecks pertaining to the legal framework
- Assess the existing human resource, technological & organizational capabilities
- Share experience from Korea's land information system (KLIS) on how to best adapt to the Ethiopian context

- Suggest policy recommendations and action plans on how to implement Ethiopia's land registration system.

1.3. Scope

This paper assesses bottlenecks in modernizing Ethiopia's urban land registration and indicates possible pathways to overcome those hindrances, thereby sustainably scaling up the pilot projects aimed at modernizing Ethiopia's urban land registration. In doing so, it highlights how to adapt Korea's experience to Ethiopia's land policy context.

2. Overview of Land Policy and Urbanization in Ethiopia

2.1. Ethiopia's Land Policy

Ethiopia's land system can be seen as having evolved through three distinct administrations ruling Ethiopia: The pre-1974 regime (mainly the imperial regime), the Derg regime (1974–1991), and the current government (EPRDF, since 1991).

A historical review of the land holding system of feudalistic Ethiopia reveals that the king owned all the land. Other private people, families, or the church derived their claim to the land from imperial land grants. During the reign of Haile Selassie, private ownership of urban land was reemphasized by the subsequent Constitutions of 1931 and 1955 as well as the 1960 civil code. Up to the coming of the 1974 Ethiopian Revolution, landlords in different urban areas invested much in the development of housing for rental.

In 1975, the military council, Derg, comprised of representatives of the different armed forces in the country, succeeded in ousting the Imperial regime from power. In June of the same year, the government enacted a new law for the nationalization of urban land and extra rentable houses (Proclamation No. 41/75). Accordingly, all urban lands and extra houses of the wealthy urban dwellers were confiscated without any compensation.

Concerning urban land, the proclamation put all land in the hand of the state. No urban land was to be transferred by sale, mortgage, succession, or otherwise (Art. 4(1)). A person requiring land for building a dwelling house was to be granted it free of charge up to 500m2 according to the Ministry of Public Works and Housing (Art. 5(1)) The proclamation also allowed ownership of only a single

dwelling house (Art. 11(1).) The transfer of private houses by succession, sale, or barter was permitted (Art. 12(1).) All extra houses became government property and no person, family, or organization could acquire revenue from urban land or houses (Art. 20(1).)

The present government came to power in 1991. According to the 1995 Federal constitution, all urban and rural land is the property of the state and Ethiopian people. Article 40 of the Federal Constitution, which relates to "Right to Property," provides "the right to ownership of rural and urban land, as well as of all natural resources, which is exclusively vested in the State and in the peoples of Ethiopia. Land is a common property of the Nations, Nationalities and Peoples of Ethiopia, and shall not be subject to sale or to other means of exchange" (Sub-Article 3).

To make a provision for urban land use under the umbrella of public ownership, the first leasehold proclamation was made in 1993. This is called the Urban Lands Lease Holding, Proclamation No. 80/1993. Due to the ambiguity in land holding, another proclamation, 272/2002, was devised. This proclamation repealed the first law and made provisions to make any urban land under the lease system. This was in response to the enormous demand for land and to ensure an equitable distribution and avoid illegal settlements. Since only small areas of cities have a cadastral map, only a small share of urban land has been converted to lease systems.

Proclamation No. 721/2011 has addressed important issues that were missing in the previous lease policies. Among others, it states lease payments while formalizing informal settlements and consolidating permit and leasehold tenure systems, in which case a lease benchmark price /minimum lease price is applied. The benchmark prices also serve as the minimum prices for local areas. This proclamation improves uniformity and transparency of the implementation of urban land policy, as opposed to previous proclamations. However, among the limitations is its failure to clearly state the mechanisms and time frame about the modality of converting old possessions into leaseholds. Proclamation No. 721/2011 also provides detailed lists of development activities that can request urban land holding through allotment. There is an improvement over previous proclamations with regard to fair allocation of urban land, collection of adequate revenue from leasing, and transparency characterizing the land transfer process.

Under the three proclamations on urban land use, different land use transferring systems have been practiced. <Table 3-1> below summarizes the different modalities of urban land use transfer as stipulated in the urban lands lease proclamations.

〈Table 3-1〉 Modality of Urban Land Transfer or Allocation

Proclamation	Proclamation No. 80/1993	Proclamation No. 272/2002	Proclamation No. 721/2011
Modality of Land Transfer	Tender	Tender Negotiation Allotment	Tender Allotment

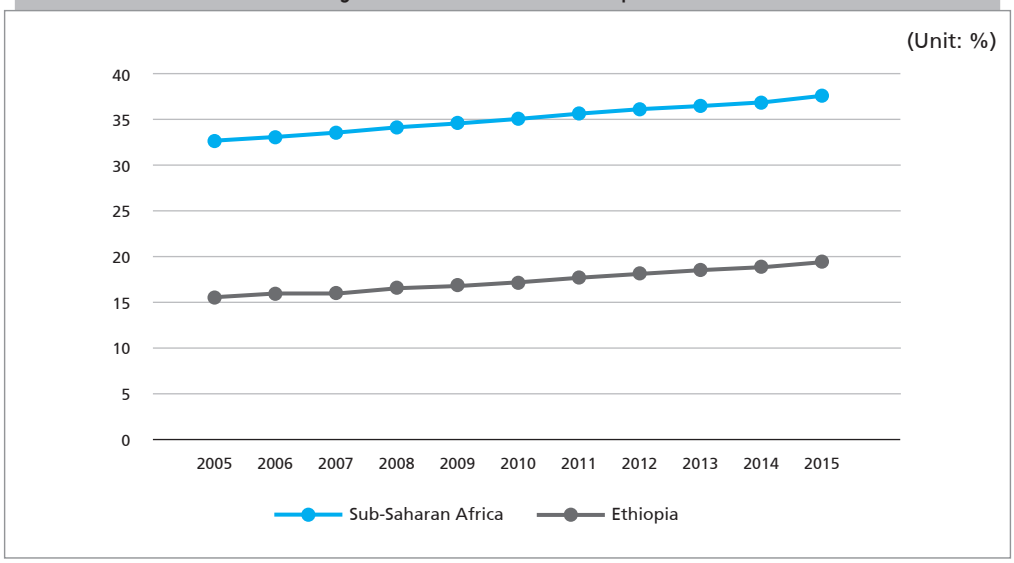
Source: Federal Lands Lease Holding Proclamation No. 80/1993, Proclamation No.272/2002, and Proclamation No. 721/2011.

2.2. Trend in Urbanization in Ethiopia

The urban development rate in Ethiopia is one of the lowest in the world. Many of the middle-sized towns in Ethiopia were founded during the nineteenth century for political-military reasons. In Ethiopia, the main factors believed to catalyze the urbanization process include proximity to existing cities, population density and growth rate, presence of new and large commercial farms and agro-industries, large infrastructure investments, and job opportunities in the industry and service sectors.

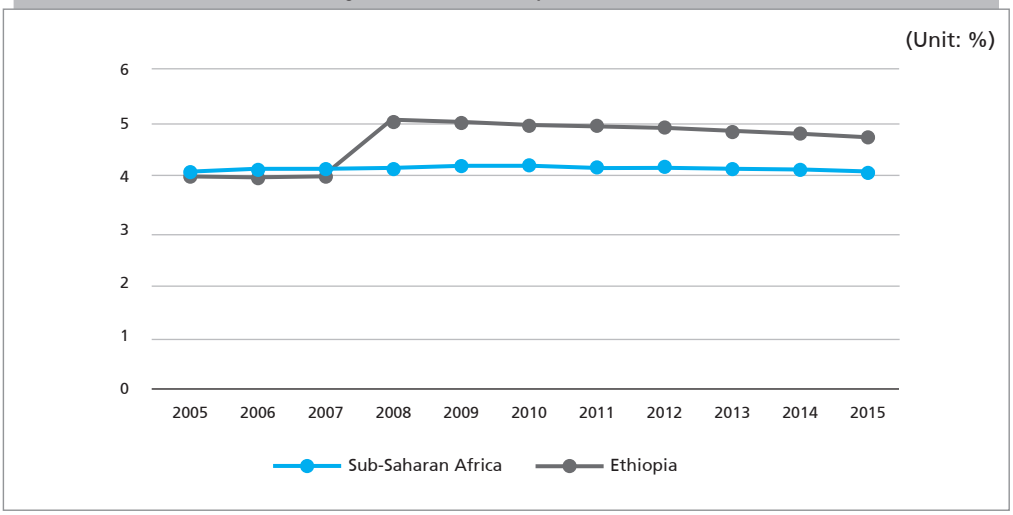
Currently, Ethiopia is experiencing a rapid urbanization, at a rate of 5.4% per annum, which is expected to nearly triple the urban population within two and half decades. As of early 2014, it was estimated that only 19% of Ethiopia's population lived in urban areas, while the average share of urban population in sub Saharan Africa (SSA) is about 38% (see Figure 3-1 below). [Figure 3-1] puts Ethiopia as one of the least urbanized countries, even by sub-Saharan standards. However, the country has one of the highest urbanization rates. [Figure 3-2] below shows that Ethiopia's urbanization rate has consistently exceeded that of SSA's average since 2007. As of 2015, Ethiopia's urbanization rate is estimated at 4.8 percent, which is higher than the SSA's average of 4.1%. This urbanization process in Ethiopia is expected to bring 30 million more people to its cities between the years 2015 and 2035.

[Figure 3-1] Share of Urban Population



Source: WDI (2017).

[Figure 3-2] Urban Population Growth



Source: WDI (2017).

<Table 3-2> below shows predicted urban population size of six selected regions up until 2037. Already in 2024, Oromia, Tigray, and SNNP are predicted to have their urban population increase by 63%, while the Amhara region will see its urban population grow by 66%. On the other hand, Addis Ababa's urban population will grow by about 30% within the next ten years. This means that policy makers need to proactively plan and enhance the capacity of urban centers to accommodate the projected increase in their residents before they are overwhelmed.

〈Table 3-2〉 Predicted Urban Population Size in Millions in Selected Regions During 2014–2037

(Unit: thousand)

Regions	2014	2019	2024	2029	2037	% increase 2014-2037
Oromia	4,647	5,933	7,595	9,617	13,562	+191.8
Amhara	3,127	4,090	5,198	6,436	8,711	+178.6
Tigray	1,200	1,547	1,964	2,447	3,334	+177.8
SNNP	2,707	3,497	4,404	5,449	7,334	+1709
Harari	125	145	166	189	228	+82.4
Somali	764	893	1,039	1,202	1,511	+97.8
Afar	290	387	504	638	897	+209.3
Gambela	124	165	217	278	392	+216.1
Benishangul	189	258	340	441	640	+238.6
Dire Dawa	268	313	366	427	533	+98.9
Addis Ababa	3,119	3,604	4,030	4,447	5,132	+64.5
Total	16,734	20,965	25,960	31,687	42,274	+152.6

Source: Central Statistics Authority (2014).

2.3. Status of Urban Services

There is high pressure in urban populations that resulted mainly from rural-to-urban migration, which contributes to the growing housing and welfare problems of the urban poor and urban unemployed. Considering Addis Ababa as a case in point, the disproportionate focus of the government on infrastructure investment in Addis Ababa and relatively slow growth of other cities in Ethiopia has forced residents in other cities to move to Addis Ababa every year. These include the business community, new university graduates, and other professionals. These new residents of Addis Ababa require social services, including housing, which puts additional pressure on the already-big demand for social services in the city.

This rapid, as well as massive, increase in urban numbers inevitably leads to increased demand for urban housing and other social services including industrial, commercial and recreational uses. For this reason, access to services such as infrastructure, clean water, and electricity are limited in most urban centers in Ethiopia. This is mainly because urbanization is taking place at a higher pace than the local governments' resources and administrative capacity to make public services available. It is thus imperative that the urban development strategies target poverty

and unemployment reduction as part of their integral goals.

For cities to provide public services that match the increasing urban population, there needs to be a well-functioning market for land, among other things. Moreover, there is a need for engagement of the urban population in development and governance, enhancing public private partnerships, and decentralizing administration for cities to be capable of self-administration. This requires creating a stronger local capacity for cities to develop and manage urban infrastructure and services, and to deliver them more effectively and efficiently.

Similar stories happened in the Korean experience. From 1960, rapid industrialization and urbanization was seen in the Republic of Korea, which resulted in migration of rural populations to urban areas as well as special attention given to land use for development projects to create land policy. Over time, land and housing prices increased, especially in large cities and expansion areas, to which the population migrated. Speculation was common in the markets of housing and land in development, which led to social inequality in assets. The government recognized that land use and land development plans should be transparent, so the Korea Land Information System (KLIS) and land management system was introduced. This system is associated with the tax system related to land development. Accordingly, lessons must be learned from the Korean experience in line with the country's actual situation.

3. Ethiopia's Urban Land Registration: Current Practices and Associated Problems Hindering its Modernization

3.1. Current Situation

3.1.1. Average Land Holding by Region

<Table 3-3> shows the percentage of households and their land holding, and percentage rented out and rented in for some regions and urban areas.

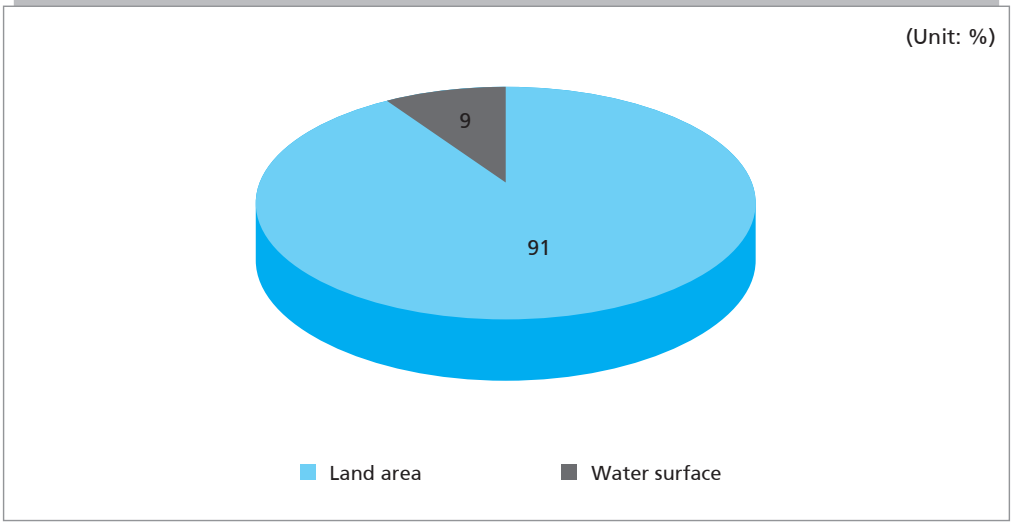
〈Table 3-3〉 Average Land Holding by Region

	Owned		Rented out		Gift		Rented in		Other	
	%of HH	Size (ha)	% of HH	Size (ha)	% of HH	Size (ha)	% of HH	Size (ha)	%of HH	Size (ha)
Tigray	92.6	0.8	19.7	0.06	2.5	0.02	32.2	0.16	2.7	0
Amhara	96.6	1.06	24.7	0.09	4.6	0.02	40.3	0.24	2.9	0.01
Oromiya	93.4	1.29	7.8	0.05	8.7	0.04	21.5	0.16	7.8	0.04
SNNP	96.6	0.64	2.6	0.01	3.5	0.03	13.4	0.04	8.3	0.03
Other regions	73.8	0.52	6	0.02	28.1	0.05	9.3	0.08	2.7	0.01
Rural	94.2	1.02	12	0.05	7.2	0.03	25	0.15	5.8	0.03
Small town (urban)	63.5	0.16	13.9	0.04	5.3	0.04	27.4	0.03	18.8	0.02
Large town (urban)	76.6	0.28	12.8	0.06	8.7	0.01	17.2	0.07	11.8	0.01

Source: National Bank of Ethiopia.

[Figure 3-3] and [Figure 3-4] show the percentage of land use in Ethiopia. Even if most of the land is not being used, 26% of the majority highland provides agricultural land.

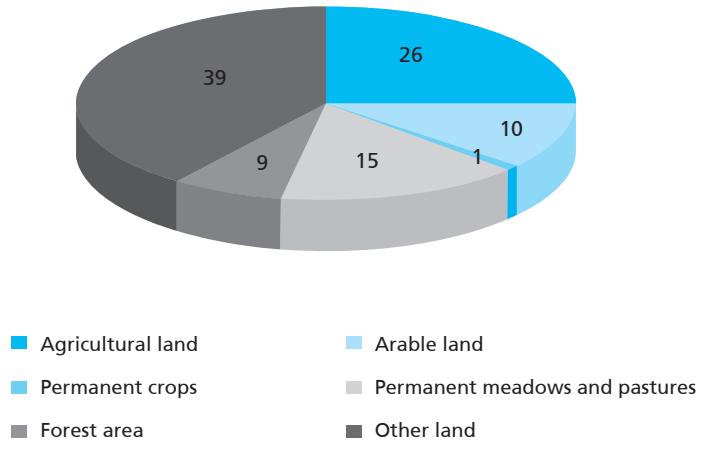
[Figure 3-3] Share of Land and Water



Source: Worldstat Info, http://en.worldstat.info/Asia/Ethiopia/Land.

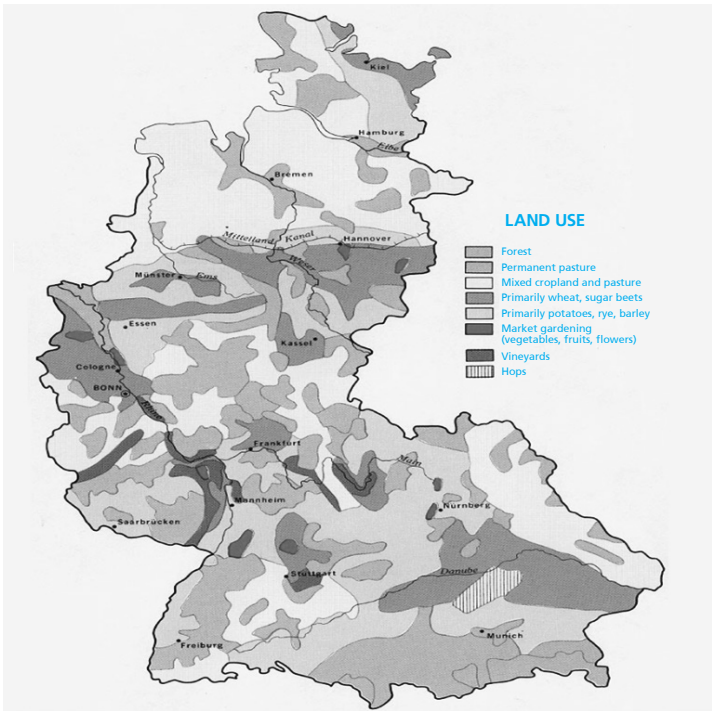
[Figure 3-4] Share of Land Use

(Unit: %)



Source: Worldstat Info, http://en.worldstat.info/Asia/Ethiopia/Land.

[Figure 3-5] Land Utilization Map



Source: MapCruzin,
http://www.bing.com/images/search?view=detailV2&ccid=pYVQMeXZ&id=CEAB022563CCC451F7FD344488256B79A6E9598A&q=ethiopia+land+map&simid=608009586338038205&selectedindex=150&mode=overlay&first=1&thid=OIP.pYVQMeXZbEEmgo10qqm9UADOEs.

In Ethiopia, there are major challenges in land-related registration, and thus improvement is required. These challenges are related to technical issues and legal frameworks, which are described in the next section (3.2).

3.1.2. Ethiopian Land Registration

The Addis Ababa city administration set up its own registry agency in 2015 called "Land Holding Registration and Information Agency (LHRIA)" (Federal Urban Land & Landed Property Registration and Information Agency). The objective was to undertake the new legal cadaster system mainly at the city and sub-city levels. LHRIA has benchmarked systematic adjudication and registration for two sub-cities (Bole and Nifas-Silk Lafto) for completion of about 600,000 properties during 2015–2020. According to MoUDH, 71,000 parcels out of the existing 400,000 parcels were demarcated as of June 2016. LHRIA sent about 6600 parcel requests to the title administration agency for creation of ownership rights (or use-rights); only 2800 parcels got a response, while response for the remainder was delayed due to constraints.

The GOE has planned to establish 200 continuously operating reference stations, train over 50,000 staff, and implement a new systematic adjudication and registration system (urban legal cadaster system) in 240 cities by the end of the GTP2 period. A new policy strategy in 2013 gave way to the establishment of the federal land and property registration agency in February 2014. Out of 1000 cities, 23 have produced a base map for systematic adjudications with a principle of fit for purpose. There is a plan to extend base map production to 30 more cities, once the capacity building activities for regional states takes place.

〈Table 3-4〉 List of Cities (by Region) with Base Map for Systematic Adjudication

Amhara	Oromia	SNNP	Tigray	Harari	Dire Dawa
• Debremarkos	• Bishoftu	• Hawassa	• Mekele	• Harar	• Dire Dawa
• Bahir Dar	• Adama	• Dilla	• Axum		
• Gondar	• Assela	• Welayetasodo	• Adigrat		
• Dessie	• Jimma	• Arbaminch	• Shire		
• Kombolcha	• Nekemit	• Hosaena			
• Debrebirhan	• Shashemane				

Source: FLPRA (2015).

As part of the effort to make the cadaster system mainstream at the national level, the government is undertaking the use of system development technology nationwide (FLPRA, 2015). During the GTP2 period (2015–2020), the government plans to develop a legal cadaster system in 91 cities. However, these plans have many limitations. In this case, this pilot study with a sample city may be a starting point for further developments.

3.2. Associated Problems

3.2.1. Organizational and Related Challenges

Lack of consistent practices across cities in Ethiopia is among the major problems characterizing land registration in Ethiopia (FLPRA, 2015). This was mainly related to lack of land registration institutions at the federal and regional levels, which coordinate the legal cadastral works and administer land information. Currently, in the country, land issues are vested in power between two ministries at a federal level: the Ministry of Agriculture and Rural Development (recently renamed from Ministry of Farming and Natural Resources) for rural land issues, and the Ministry of Urban Development and Construction (recently renamed from the Ministry of Urban Development and Housing) for urban land issues. This creates challenges in land registration, since these two institutions are separate with separate delegations in the country, which brings coordination problems in land registration in the country.

Skilled HR gaps are another capacity challenge facing the modernization of Ethiopia's land registration. A study done by USAID (2015) identified priority areas for specialization in graduate programs and short-term post-graduate training: applied spatial analysis, advanced remote sensing, GPS use, land policy analysis and formulation, land law and legislative drafting, land dispute resolution, and urban and rural development planning. <Table 3-5> below presents the human resource gap assessment by USAID (2015) by time and area of expertise. For instance, in the short term, the country needs 7500 more surveyors.

〈Table 3-5〉 Skilled Human Resource Gap Assessment

Time frame	Expertise	Required number
Short term (5 years)	Surveyors	7,500
	Technicians	8,500
	GIS technicians	5,200
	Land property lawyers	5,200
	Land real estate appraisers / tax specialists	2,200
	Para surveyors	60
Medium term (10 years)	Land use city planners	7,000
	Land use managers	4,000
	University and TVET instructors	200
Long term (20 years)	Land administration experts	10,700

Source: USAID (2015).

USAID (2015) has also documented education and training gaps identified by regional and urban authorities in the current workforce and how training needs can be met. <Table 3-6> below presents the required number of experts by their level of education/training. For instance, field training should be provided to produce about 2000 para surveyors. Likewise, the required number of experts with TVET training, undergraduate degrees, and graduate degrees is also presented below.

〈Table 3-6〉 Required Education and Training Types by Areas of Expertise

Education / training type	Expertise	Required number
Field training	Para surveyors	2,000
TVET training	Appraisal /tax specialists	10,485
	GIS technicians	12,901
	LIS technicians	12,283
	LA technicians	36,561
	Surveyors	23,658
	IT technicians	135
Undergraduate study	LA experts	13,172
	Land use managers	7,713
	TVET instructors	150
	Land use and city planners	13,720
Graduate / professional study	Land policy experts	20
	Land lawyers	15,693
	University LA instructors	50

Source: USAID (2015).

Lack of modern technology use is another challenge related to organizational capacity of land registration institutions in Ethiopia. Most land holding information is being handled by a manually maintained filing system. This causes loss of information, too many delays in service provision, and client dissatisfaction. Lack of a digital database to maintain land holding right information also means that it's hardly possible to coordinate and share information across land administration institutions, leading to inconsistency in land management operations. A notable example of this is a lack of consistency between systematic adjudication and registration among the Title Administration Agency, Addis Ababa Land Management Bureau, and Land Holding Registration and Information Agency.

Recently, LHRIA had sent 6,600 titles to be checked by Title Administration; however, Title Administration had responded regarding only 2,800 titles. Moreover, the adjudication cannot commence until the Land Management Bureau provides the parcel file, which was delayed because it took too long to locate the parcel files. This case in point demonstrates the lack of coordination between different institutions as well as the poor file management system characterizing the land management organizations. Absence of a reliable land information system will also make it easier for rent-seeking officials to easily manipulate information for their own benefit. Most noticeably, the use of modern technology, which is very essential in land registry, as seen in Korea, is not available in Ethiopia.

3.2.2. Financial Constraints

Another challenge slowing down modernization of the land registration process is shortage of logistics and finance. Land registration requires a huge amount of finance that must be allocated annually. In this regard, the country is facing challenges. Ethiopia is still a low-income country and hence unable to independently finance big projects, such as nationwide legal cadaster registration, in a short period of time. Nevertheless, the country has demonstrated an enormous increase in its capacity to mobilize resources domestically. This is most vividly shown by its having completed half of its great renaissance dam projects, worth more than USD 4 billion, almost exclusively by raising domestic resources. Currently, taxes and other domestic sources account for more than 80% of government revenue, which is a far higher proportion compared to a decade ago.

Despite its increasing capacity to mobilize resources domestically, the country has been aggressively engaged in infrastructure projects, including roads, railways, and hydropower dams. Spending on these mega projects makes the government too stretched to set aside enough funding for other projects such as the legal cadaster project. In addition, local governments have limited mandates and ability to raise resources for their own legal cadaster undertakings. For this reason, they have

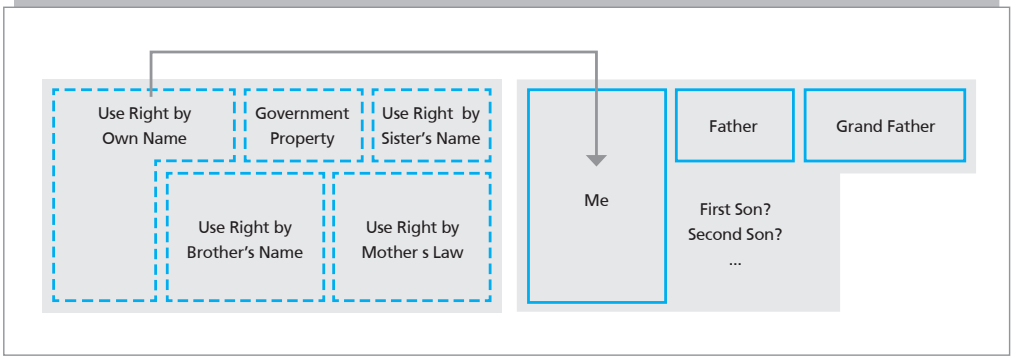
acquired the larger proportion of the funding for these purposes from the federal budget.

To ease these financial constraints, the government needs to design alternative mechanisms. First, it needs to look at its valuation of property taxation and make proper revisions as well as enhance local governments' capacity to raise part of the financing independently to make spending on land management sustainable. It also needs to seek support from development partners either though bilateral or multilateral cooperation.

3.2.3. Other Related Challenges

Other challenges include increase in land value with infrastructure, and complicated use of right identification. In some cases, it is difficult, if not more complicated, to identify the person who has a use right, as depicted in [Figure 3-6].

[Figure 3-6] Complexity of Land Holding



Source: Author's own contribution.

4. Review of the Korean Land Information System (KLIS)

Part of the reason why Korea achieved sustained economic growth is due to its well-organized land registration system. During the 1970s and 1980s, there began speculation in the land market along with economic growth. Cities began to be overcrowded. In response, the Korean government set up various strategies and policies so that land was equitably distributed and optimally used for the benefit of the public. To this end, the government exercised control over land market either directly or indirectly.

The "master plan for national GIS establishment" was enforced in 1995, which gave way to consolidation of policies related to national geographic information. The first and second master plan for national GIS focused on setting up geographic information infrastructure, such as national base maps and Cadaster maps. The third master plan, during 2006–2010, was mainly aimed at utilizing the rapidly improving information technology and facilitating the creation and use of the national- and municipal-level geospatial database. The fourth master plan focuses on implementing universal computing technologies to enable easy access of spatial information anywhere by any person. The integrated databases and related system databases were made consistent and up-to-date through direct connection with the national geographic information system. It was also possible to offer public Cadaster services by establishing accurate and reliable land information by unifying the national survey standards used in the geodetic, cadaster, and marine fields. This led to economic development and improvement of public services.

Korea established the KLIS to provide various support systems in one umbrella. These include land administration support systems, cadastral surveying performance recording systems of 232 local governments across the country, land management support systems of 15 metropolitan councils, and land policy support of the MOLIT. KLIS has enhanced the utilization of information and convenience by allowing readability between systems and simplifying work processes.

4.1. Development of the KLIS Project

The cadastral map computerization project was part of the first national basic plan for GIS (KSP, 2014). Likewise, the land-related information project was part of the public GIS utilization system development project. The projects were deliberately planned to be formed under the government's leadership, while the geospatial database should be open to the public to improve the use of geospatial information in private sectors. Once the basic plan for the GIS was set up, all local governments implemented the system, so they could share and standardize datasets to help meet their local needs.

While implementing KLIS, the central government invests resources with cooperation from local government funds, which were more cost effective, compared to the bottom-up approach, where local governments cover their own costs to set up their land information system and the central government serves in an integration role. Hence, regarding financing, for some of the projects, the central government covers all the costs, while for others, it shares costs on a 50–50 basis with local governments. For instance, while the KLIS DB establishment was financed by the central government budget, purchase of computer equipment was made using local government funding. Central government funding was used to

finance programs such as LIS, technical improvement, GIS S/W provision, geospatial data management, and education.

Nationwide establishment of a project such as LIS requires financial help and enormous amounts of human resources, which are difficult to mobilize in a few years. In the case of KLIS, cadastral maps, serial cadastral databases, the land management operation, and development system can be built based on financial support.

For this reason, KLIS was implemented on a step-by-step basis for years as it was gradually expanded nationwide. The government begin implementing KLIS in big and medium cities because the need for KLIS became stronger, allowing it to gradually expand into small cities.

The pre-existing regulations regarding the land management system were newly adapted for the successful implementation of KLIS, as the land policies were based on analogue work systems, which are different from the newly established digital systems. While digitalizing the pre-existing analogue data, there were challenges in finding accurate data and various standardized data forms. Inaccurate and lack of analogue data as well as differences in register forms caused difficulties in the digitalization process. During the pilot project, there were attempts to perform a comprehensive assessment of those problems and to apply different solutions.

KLIS was meant to provide geospatial information including serial cadastral maps to the public and private sector rather than being a mere administrative service provision (MOLIT, 2014). In doing so, it was supposed to solve the pre-existing cadastral data access problems. To that end, a pilot project was undertaken to assess the pre-existing system architecture and the technical problems associated with it, and to propose methods for developing the new land information system architecture and institutional measures to solve the problems. The pilot project helped to design the system architecture, application architecture, and data models. An open architecture was planned to take care of digitalizing environments for local governments consisting of hierarchical 3-tiered systems: clients, application server, and database server.

A single database server was made to include spatial and attribute databases, which are related to cartographic map, cadastral map, serial cadastral map, etc. These databases are constructed from stand-alone original maps. For instance, the cartographic map database was constructed using only major spatial features such as roads, buildings, and railways from the original cartographic map. Attribute databases consist of information on physical characteristics of land, land prices, real estate brokerage, etc.

KLIS had to be supported with new strategies and accurate existing maps produced with analogue methods. Legislations were necessary to legalize operations under KLIS. There was also a need to reform laws and integrate activities by different land-related government institutions. There was also a need to set up standards (e.g., drawing production methods) and administrative procedures for smooth functioning of the KLIS.

As is always the case for newly introduced technology, there was reluctance on the part of public officials to be involved in KLIS, partly due to lack of cognizance and partly due to hesitation to accept extra duties. KLIS thus had to provide approaches for advancement and instruction on the use of land information for the officials. A series of workshops helped boost awareness of and pride in KLIS.

4.2. Accrued Benefits of the KLIS

By computerizing the process, the KLIS helped to significantly improve the efficiency of the cadastral administration and local government land use services. This helped to improve planning of development projects.

The implementation of the KLIS allowed the issuance of civil documents related to land prices and land development plans wherever and whenever online. This drastically reduced the time required for perusing and issuing civil documents. Making more accurate information available much faster than before, the KLIS resulted in an improved quality of public administration.

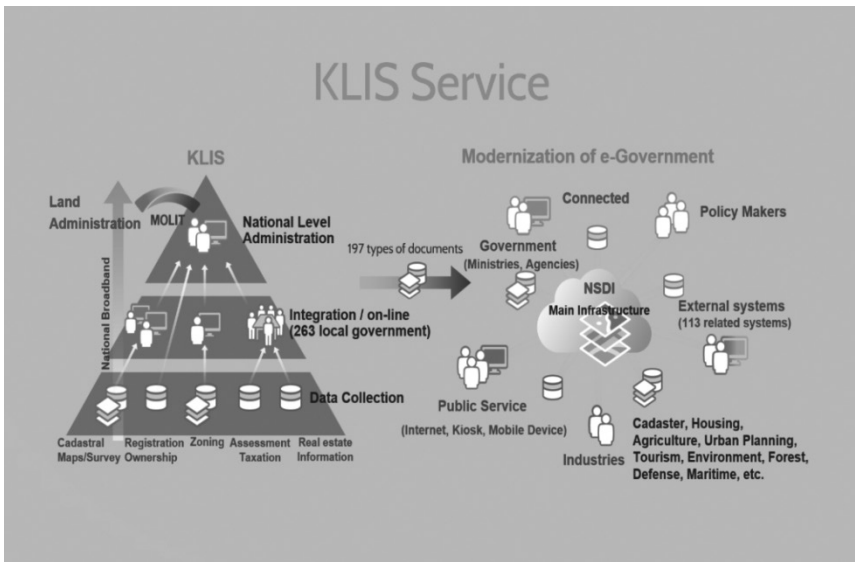
Among the notable effects of the KLIS are quality improvement in central government's policy making, efficiency and quality improvement in land administration and convenience of civilians. In addition, the time and transportation costs for public officials and civil service users declined. For instance, the process of submitting objections on publicly announced land prices was shortened from ten days to three minutes.

Before the establishment of KLIS, information on a single parcel was managed by three different administrations. PBLIS managed cadastral map information, location cadasters and individual cadasters. The cadastral administration managed the owner's record, registration number, and address. On the other hand, serial drawings were managed by LMIS. A lack of integrated parcel administration caused confusion on the part of the users. The KLIS removed this confusion by integrating these databases and application systems and provided users with the integrated access screen, which only requires a unified ID.

The KLIS also provided common information regarding cadastral information.

The existing multiple servers were also integrated, leading to more efficient computing. [Figure 3-7] shows the current KLIS services.

[Figure 3-7] The KLIS Service Structure



Source: LX (2016).

5. Proposed Solutions to Overcome Hindrances in Modernizing Ethiopia's Land Registration

It is imperative that the various bottlenecks discussed above be tackled so that the country facilitates the modernization of its land registration system. In the GTP2 period, the federal land and real property registration agency (FLPRA) plans to implement various projects under the urban map production, and surveying the land use right registration program.

These projects include, among others: the urban legal cadaster information development project, the urban map production and surveying capacity development project, and the modern property valuation and tax system development project.

The overall objective of these projects is to create an efficient and effective

land administration at the federal, regional, and metropolitan levels using a readable, progressive, secure system of legal cadaster and information exchange. This will help to facilitate the exchange and marketing of property, improve good governance, and reduce wastage of land and illegal land holding.

However, successful implementation of the above projects requires improving the legal framework, and building organizational, HR, and financing capacity.

To overcome limitations seen in most of the cities land and related property institutions, they need capacity building interventions in their organizational structure, human resource skills, technology use, and financing as discussed in the following sub sections.

5.1. Organizational Capacity

As mentioned earlier, Ethiopian land registration agencies have been operating as an integral part of other municipal functions. Currently, however, separate land registration bodies are being established at the city level with a separate organizational structure.

The new land registration government bodies should map out a staffing plan that outlines the type of staff required to sustain the urban legal cadaster through systematic adjudication and registration as well as to run the ongoing operation of the legal cadaster once it's finalized. Once a staffing plan is ready, there needs to be a plan on how to continuously build capacity through training in selected skills to certify an operative and efficient process of the urban legal cadaster. To build capacity in HR skills, there needs to be introductory, mid-level and upper-level trainings in surveying, basic map preparation, cadaster data gathering, GIS, land management system, data base management, and information communication technology. This requires identification of training institutes and providing the training on a continuous basis at different levels of land administration structures.

This also requires letting selected universities introduce their curriculum in urban land management and administration so there will be an increasing number of graduates to take positions around the country as the implementation of the cadaster is scaled up from pilot projects to more cities nationwide.

Furthermore, there needs to be coordination between federal and regional cities as well as between relevant institutions including communication and information technology ministry, information network security agency (INSA), map works agency, ethics and anti-corruption commission, and justice ministry, among others.

While setting up land registration government offices both at the federal and regional levels, care should be taken to avoid surplus capacity or insufficient capacity to meet demand for services. This can be done by linking offices to places of perceived or actual demand rather than administrative jurisdictions (Land Equity, 2016).

Land registration organizations need also to enhance their HR capacity. The most efficient way to meet skill need, particularly at the lower level of skill need, is TVET training. Hence, we need to increase the number of TVETs and their capacity to graduate a larger number of experts. There also needs to be a way for TVET graduates to upgrade their education to degree level. This will allow an increasing number of students to transition from TVET to university level professionals. Likewise, we need to raise the capacity of undergraduate and graduate programs regarding the number of graduates annually from its current level as well as improve their quality. Besides, establishing bilateral cooperation between local and foreign universities in land administration is vital to stimulating advanced education. Korean support in providing advisory services to the land registration agencies, and providing field training to experts would be instrumental to enhancing HR capacity.

5.2. Finance

To solve budget constraints in the land registry, participation of the local government in land registration will help the federal government in solving the country's financial challenges. In addition, encouraging the private sector in the area will also contribute positively to this end. In this regard, Korea's experience can help Ethiopia, in which the country has followed 50:50 financing between central government and local government in the establishment of the land information system.

To undertake the overall program related to land holding right registration during the GTP II period, the government estimates that it needs about 1.9 billion birr.[1)] Implementation of the legal cadaster requires finance either from the government budget, or a loan or grant from bilateral or multilateral agencies. For instance, Korea's EXIM bank pledges to support the Ethiopian government in undertaking the implementation of the ongoing legal cadaster. In addition, multilateral agencies such as the World Bank can potentially be a source of funding to help support the Ethiopian government to partly finance the implementation of the legal cadaster.

1) This amount is equivalent to USD 85,094,160 using the current exchange rate of 1USD=22.33ETB.

However, once legal land holding rights start being issued, the land registration bodies can adopt a policy of self-financing by introducing charges and fees to clients. To provide efficient services that can generate their own financing, the registration body shall develop a corporate strategy and business plan to guide its operation (see also Land Equity, 2016)

Likewise, lessons from other countries (such as Korea) that have succeeded in modernizing their land registration system will help indicate pathways for Ethiopia concerning how to modernize its land registration system.

In Korea, the cost was borne by the central government and the local government. In the beginning of the nationwide LIS project, lack of funding was solved by a step-by step project instead of nationwide spending. The LIS project was started by the larger local government, and finally finished by the smaller government. The central government planned and arranged the schedule for local government initiation.

5.3. Reforming the Legal Framework

An urban land-holding rights registration should depend on a standard legal framework, working manuals, secure information, and data sharing system (FLPRA, 2015). This can be reviewed by adapting the legal framework of an example country (such as Korea) for Ethiopia under the umbrella of Ethiopia's land policy context. This will help to set up a consistent legal cadaster system across cities in Ethiopia as well.

In addition, efficient approval of land registration bills at the parliament requires continuous collaboration between parliament subcommittee working on urban development and officials from the land registration government bodies. The central government needs to play an important role in creating regulations, adjusting local government's rules, and establishing laws related to LIS. The Ministry of Housing and Urban Development plays a leading role in promoting legal issues related to the LIS project.

The following examples illustrate the detailed legal framework of Korea: the cadastral act, the act on the utilization and management of national territory, and the real estate registration act. The Ministry of Government Administration and Home Affairs (MoGAHA) and Ministry of Land and Construction (MoCT) developed the PBLIS and LMIS, respectively. Recently, new laws were created: the national spatial data infrastructure act, the land survey and waster way service and cadastral act, the act on planning and utilization of national territory, the restitution of development gains act, the act on special cases concerning the acquisition of lands

for public use and compensation, and the aliens land ownership law.

6. Policy Recommendations

6.1. Policy Recommendations: KLIS Experiences

In 2004, KLIS integrated two existing systems: LMIS of the MOLIT and the PBLIS of the Ministry of Security and Public Administration. This relates to the cadastral administration areas of the city, county, and district administration information project and aims to secure data consistency and to enhance user convenience.

When its installation was completed in 2006, system functionality increased leading to client satisfaction and efficiency in the national level land management. Korea established the KLIS to provide various support systems under one umbrella. These include land administration support systems, cadastral surveying performance recording systems of 232 local governments across the country, land management support systems of 15 metropolitan councils, and land policy support system of the ministry of land, infrastructure and transport (Korea Exim Bank, 2014). KLIS has enhanced the utilization of information and convenience by allowing readability between systems and simplifying work processes.

Each local government has constructed a spatial database including cartographic, cadaster, serial cadaster, edited cadaster, and zoning database sand necessary attributes attached to the object of the spatial database. By digitalizing the process of land administration, KLIS has brought enormous efficiency. It has led to the improvement of local government civil services provisions regarding land use. It has also made urban planning more effective. For instance, KLIS led to the reduction of overloading civil documents. Remote issuing and real time services saved time and money on the part of the civil servants; since legal information is available, civil service processing time shortened from as long as ten days to a day, and at times to a few minutes. Around USD 8.32 million per year was saved by reducing the administration cost because of comprising the existing books.

If Ethiopia adapts the Korean experience in setting up its land information system, the country will benefit a great deal in terms of providing efficient services to the public thereby enhancing client satisfaction, reducing cost of land administration, supporting the MoUDH to make effective urban planning, and supporting the broader economic development plan of the government.

As such, Ethiopia can set up its own Ethiopian Land Information System (ELIS) by integrating administration of land information currently conducted by the Ministry

of Communication and Information Technology, the Information Network Security Agency (INSA), and the Map Works Agency, among other institutions.

Establishing ELIS will also help local governments avoid pilling of files and loss of information due to loss of files. A more detailed discussion of the benefits and procedures to set up Ethiopia's ELIS is given in the next chapter.

6.2. Policy Recommendations: Assessing the Status of Land Information System in Ethiopia

Currently Ethiopia's land related institutions are working with little cooperation, each with its own system. The lack of a modern land information system where the land related institutions can integrate their activities and share information is partly to blame for their diminutive collaboration. Likewise, there is a huge deficit of well-trained personnel at all levels of the land administration structure. Due to this lack of a modern land information system, only limited contracts and property transactions are formally recorded to ensure property right for the public as well as mobilize taxes on properties by the government for provision of social services. Moreover, a lack of accurate land information prevents optimal and fair distribution of land use rights among the public.

One of the hindrances to an effective and efficient land development and management is the lack of a modern information system. Cities do not have a land information center and database. Land administration government bodies in cities, regions and at the federal system are not networked to share data. As a result, citizens cannot get efficient land information services, which necessitate the need for the establishment of a modern land information system. The government plans to build a modern land information technology infrastructure in the second GTP period, whereby citizens can have easy access to land information and information sharing between different government bodies is possible, which will lead to faster urban development nationwide.

A recent report by land equity (2016) provides a review of the ICT use by land administration bodies both at the federal and regional levels. The review report reveals the types of the ICT systems, whether it is in a development phase or is in operation, its specific use, as well as its limitations and proposed alternative ICT solutions.

<Table 3-7> below summarizes the ICT systems being used in land administration and systematic registration at the regional and federal levels.

〈Table 3-7〉 Current ICT Systems in Regional and Federal Land Administration and Systematic Registration

System	Agency	Sector	Scope	Status	Description
Addis Ababa Cadaster Information System (AA-CADIS)	AALHRIA	Urban	Addis Ababa	Operational	AA-CADIS is comprised of two software applications: Real Estate Cadaster System (RECS) is a customized GIS for maintaining the Addis Ababa urban cadaster, and Real Property Registration System (RPRS) manages property rights, restrictions and respon-sibilities such as lease, permit, mortgage and court injunctions.
Interim Urban Land Holding and File Management System (IULHFMS)	MoUDH	Urban	Mekele, Bahir Dar, & Dire Dawa	Operational	Software to create an integrated land records system of the existing land paper files, legal registries and base maps in three pilot cities.
Land Investment for Transformation (LIFT)	MoA	Rural	Amhara, Oromia, SNNPR, Tigray	Operational	Software supporting the rural land systematic registration program being conducted by Land Investment for Transformation (LIFT). Includes two software applications: Interim Mass Registration (iMASSREG) and Interim Woreda Rural Land Administration Information System (iWORLIAS). The goal of the program is to register 14 million rural land parcels in 5 years.
National Rural Land Administration Information System (NRLAIS)	MoA	Rural	Ethiopia	In Development	NRLAIS will be a comprehensive software system handling both systematic and sporadic registration of rural lands throughout Ethiopia.
Computerized Property Tax Administration System (CPTA)	MoUDH	Urban	Ethiopia	In Development	A computerized property tax system for urban land to facilitate equity based efficient and fair taxation.

〈Table 3-7〉 Continued

System	Agency	Sector	Scope	Status	Description
Computerized Property Tax Administration System (CPTA)	MoUDH	Urban	Ethiopia	In Development	A computerized property tax system for urban land to facilitate equity based efficient and fair taxation.
Archive Management System	AALHRIA	Urban	Addis Ababa	Operational	A simple document archive management system developed by the IT Administration Team within AALHRIA.
Public Web Portal	AALHRIA	Urban	Addis Ababa	In Development	A public web portal that will allow the general public to access a broad range of information about the AALHRIA and information on current and upcoming registration areas.

Source: Land Equity (2016).

The ICT review report deems the testing, methodology, workflow, development environment, and support model as appropriate. The following subsections present the findings of the ICT review report with respect to the ICT systems' capability and deployment, among other aspects.

6.2.1. Cadaster and Real Property Registration System (CRPRS)

CRPRS is a national platform for the implementation of the legal cadaster throughout the country. Currently under development by INSA, its initial release is due in the second half of 2017 (Land Equity, 2016). Upon successful completion, it is supposed to be the dominant source of urban land registration information, replacing the existing regional and interim systems for urban land administration.

The ICT review of CRPRS reveals that: its technology and development approach are consistent with international software development practices; the Ethiopian Land Administration Domain Model (ELADM) is an appropriate choice for its core data model; its development environment constitutes essential components, including source control (Git), issues/bug register (Jira), continuous build integration (Jenkins) and multiple staged environments to support deployment and testing; the INSA Scrum Team has established their development environment and demonstrated the basic web scaffolding/skeleton for the CRPRS web applications.

The ICT review recommends that CRPRS should favor a centralized deployment model for various reasons. The ICT review also commends the fact that INSA is using the Scrum methodology for the development of the CRPRS because this allows software requirements and solutions to advance through teamwork between self-directed teams and cross-functional organizations, as well as through continuous customer or stakeholder involvement.

6.2.2. Addis Ababa Cadaster Information System (AA-CADIS)

AA-CADIS has two software systems: the real estate cadaster system (RECS) and the Real Property Registration System (RPRS). Its main feature is its decentralized architecture that allows sub cities within Addis Ababa to operate without a need to permanently be connected with headquarters. It is currently being used by the Addis Ababa land holding and information agency (AALHRIA) to implement the ongoing systematic registration activities in the city. The sophisticated distributed architecture of AA-CADIS, characterized by multi-stage workflow process, is hindering the efficient adjudication of files. As a result, the ICT review recommends not using the AA-CADIS outside Addis Ababa to support systematic adjudication. In order to streamline the capture of adjudication files in Addis Ababa, however, the ICT review suggests that AALHRIA may consider two alternatives: centralizing the capture of all adjudication files at HQ to minimize the impact of WAN issues, or ensuring two or more RPRS and RECS operators available in each sub city to support the capture of adjudication files.

6.2.3. Software for Systematic Adjudication

The ICT review also noted that none of the ICT systems reviewed are suited to effectively support the systematic adjudication process of urban lands within the country. The report suggested different alternatives. Among others, it suggested to improve the manual adjudication system and extend IULHFMS to provide functionality in support of the systematic adjudication process. Improvements to the manual system will minimize the extent of changes required to IULHFMS, potentially limiting them to supporting capture of data from adjudication forms, generating land holding rights certificate and additional parcel states (i.e., adjudicated, registered, etc.).

6.3. Policy Recommendations: Setting up ELIS—adapting from the KLIS

Three of the sustainable development goals (SDGs)—i.e., land use, innovation and infrastructure, and sustainable cities and communities—are related to the proper use of land. This shows the vital role of sustainable land use for their growth

and development. The ELIS is supposed to generate economic and social benefit by modernizing Ethiopia's land data and information. Successful establishment of the ELIS entails a more efficient and comprehensive service for the public.

One cannot overemphasize the need for building human capacity for a sustained operation of the new land management information system. While developing the ELIS, there should be a simultaneous effort to train sufficient skilled professionals at the selected universities in the future. The capacity-building component of the ELIS project should be strategically included from the beginning so that professionals would become part of the project.

As ELIS is closely related to Ethiopia's land management and administration system, it needs to be adapted to the Ethiopian land policy which is different from Korea's in which the KLIS was devised. Because land property, registration, and use in Ethiopia is different from that in Korea, the ELIS also should apply to Ethiopia's land related working procedures and land administration system or the land related laws and procedures need to be redesigned to adapt to the planned ELIS project. The staggering cost incurred to implement the KLIS also means that it is not feasible to directly adapt to the ELIS.[2)]

Prior to implementing the ELIS, there needs to be a pilot assessment of the socio-economic situation of Ethiopia together with the IT use level in the country. This would help to identify the gaps and determine the level of additional technology and skilled personnel needed to successfully implement the ELIS.

6.3.1. Implementing Strategies of the ELIS Project

6.3.1.1. Gathering Data and Constructing Database as Well as Integrating Land Data

Currently, land-related data in Ethiopia is mostly managed using a manual file handling system. By digitizing land data, the country can safely maintain land information, share land information across land institutions and provide expedient public service at a much lower cost.

6.3.1.2. Setting Up a Centralized Information Service

Under the current system, all land-related institutions share data within their own institutions and citizens should physically visit the concerned land institution whenever they need information. This is time consuming and costly for citizens. The

2) KLIS cost was estimated to be KRW(Korean won) 400 billion, of which KRW 200 billion was spent nationally and KRW 180 billion locally.

establishment of a centralized land information service would help with sharing of data between institutions by gathering data from the different land institutions and allowing access to land information online via selected IT applications.

6.3.1.3. Constructing ICT Infrastructure

Laying out a standard ICT infrastructure is important for the optimal operation of the digitized land system. Optimization of the ICT infrastructure would help to provide multifaceted land administration services. Among other elements, optimizing ICT infrastructure should constitute: electronic document system, multichannel integration, business intelligence, security management.

6.3.1.4. Standardizing the Technology Use and Conducting the Pilot Project

To integrate, connect, and share land data among land institutions, the use of a common technology is required. Data standardization is important for its sharing and reusing and unifying databases. Also, suitable management process where services are unified, linked and shared can be ensured through the application of a standard technology across intuitions. A pilot project with a sample city in certain areas can be a good start to experience the standardization of the data necessary for the construction of the land information system and the compatibility of the required computations. This pilot project may be successful in close coordination with the Korea International Cooperation Agency (KOICA)'s ODA program. It would also be good to take Vietnam as a low budget example for a data standardizing pilot study with a budget around USD 4 million.

6.3.1.5. Promoting Public Awareness

Speedy land registration is facilitated when the public cooperate to register their land resources. This can be encouraged by promoting the benefits of land registration. This would enhance voluntary land registration. To this end, citizens should be aware of the significance of state land, land registration, contract, land use rights and use of land information.

6.3.1.6. Training of Personnel for Land and Cadaster

Ethiopia is short of trained land professionals who are familiar with a modern land information system. As mentioned in earlier sections, only 2-3 out of the 33 universities in Ethiopia provides degree programs in fields related to land administration. To staff land institutions in the country with enough trained personnel, both a short term and long term training are needed. Short-term training should be available at a college level throughout the country. On the other

hand, additional universities should be selected and made to integrate degree programs in their curriculum to educate higher-level land administrators and experts.

Universities play a leading role in conducting educational and training programs, which can raise public awareness concerning ELIS. Moreover, it is important to realize that central and local government officials are responsible for operating the land information system. Hence, training and education is essential for the general public. For example, Vietnam constructed the Agency for Management of Cities (AMC) and conducted training and education for central and local officials regarding the land information system. Furthermore, it would be expedient to construct regular training on short-term and long-term schedules. The education schedule may also include the invitation seminar from the Korean Research Institute for Human Settlements (KRIHS) or Korea Land and Geospatial InformatiX Corporation (LX).

The official certificate system can be a keystone for enhancing development of works and operation in training and education. The ministry of Housing and Urban Development can design the various types of land information related certificates.

6.4. The Expected Effects of the ELIS

The effects of the ELIS are cost reduction of time and services. The ELIS may contribute to efficiency of cadastral management. People may even access land information online such as land use planning, land usages, etc. For example, in Korea, with the establishment of KLIS, the total value of time saved to access or issue documents online was about USD 44.5 million in 2011 based on a parcel survey.

Furthermore, the ELIS can contribute to an increased reliability of land information on land transaction and transparency in land transaction. Transparency in land transactions is also associated with a sound taxation system. Hence the central government needs to develop the ELIS establishment implementation system. With the establishment of the ELIS, it is possible for the government to develop and execute land use planning and land policy.

6.5. KSP Following Implementation Plan for Ethiopian Land Registration

6.5.1. Implementing Strategies for the Time-lines

The general objective of this KSP program is to identify the major problems

hindering the modernization of Ethiopia's land registration and administration system and finding policy options (recommendation) based on Korea's experiences. KSP has held two workshops so far to amend Ethiopian urban land registration, administration system and housing policy in an organized manner. The first was November 2016 in Ethiopia and the second interim one in January 2017 in Korea. In both workshops, there were serious and indispensable discussion, Important issues were raised in this discussion and forwarded there were some comments from concerned bodies (practitioner) for the policy recommendation drafted made by KDI (researchers and Ethiopian consultant).

Current needs can be categorized into two parts. These are in short term and long term support. The Ethiopian government has now started to implement a legal cadaster. To implement this, the country needs huge financial capacity and expertise in land administration and registration.

First, currently Ethiopian lack of professionals in the area is a main problem. Ethiopia only has two universities that have launched land administration courses. However, it is very difficult to find land administrative professional in the market. Even those we find from the market are not capable to make changes in land administration and registration system, and there is no proper incentive made for such expertise. Therefore, training and capacity building activities will be important issues to be addressed by the Korean expertise.

Second is financial support interim of material input to make land registration and land adjudication possible. For this implementation to work, modernized surveying instruments are required, which, of course, requires financing. Thus, it is to remain the main challenge of land registration. Capacity buildings, material support such as surveying instruments, and establishing the institution of Ethiopian land information system are crucial. The needs are stipulated as follows.

In the Short Run

Identify bottlenecks pertaining to the legal framework;
Assess the existing HR, technological & organizational capabilities;

Technical assistances are needed from Korean expertise that has good knowledge about land administration and registration. Simply, the knowledge-sharing program should be facilitated by Korean government (KDI) by coming to Ethiopia. The Koreans will show how land registration works and provide grant training for Ethiopian higher officials concerning land administration and area registration.

Surveying instruments are needed for land adjudication since they are very important for the implementation of land adjudication registration. Additionally, we need training in the technology for proper management of the instrument.

In the Long Run

A full-fledged Ethiopian land information system needs to be parallel with implementing legal, fiscal, and multipurpose cadaster in the country. However, this requires more financing and HRs.

6.5.2. Example for a Roadmap for Future Direction

<Table 3-8> and [Figure 3-8] below present a practical roadmap example and informatization in which the LX currently implements the Tunisie land renovation.

Principles to Building a Roadmap

A prerequisite for efficiently achieving land informatization is the establishment of the land information system in phases, starting from the stage of generation and acquisition of land information.

Informatization and enhancement of capacity with particular focus on top priorities to efficiently implement projects may include land survey, investigation, completion of survey results, and production of maps.

Institutional improvement and legal/policy support are key to achieving sustainable development. However, a dedicated agency for managing land information and providing policy support has not been clearly established or defined at this point. In that sense, a dedicated agency for land information management should be specified.

A roadmap for future directions from LX implementation example:

〈Table 3-8〉 Example for Implementation Issues

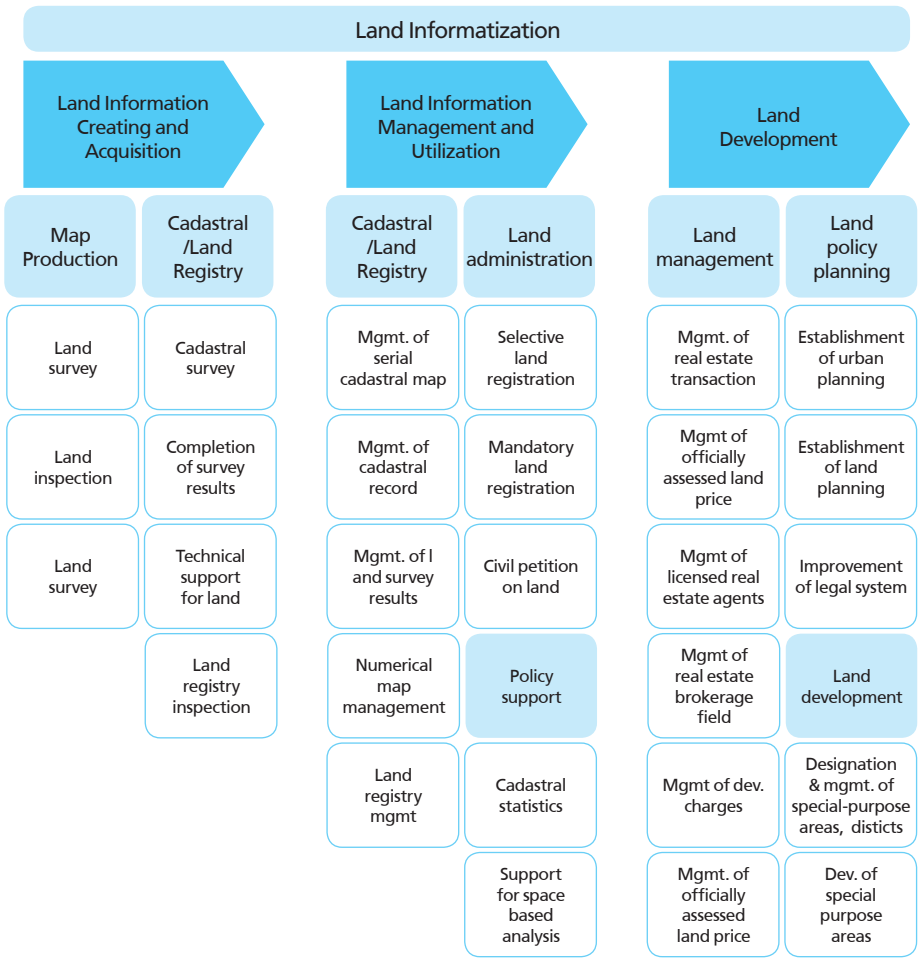
Key Issues	Implementation Issues
[1] Establishment of implementation and operation framework	(1-1) Establishment of implementation framework for land information system (1-2) Establishment of operation framework to improve, manage, and maintain land information system
[2] Establishment of Land information system and provision of policy support	(2-1) Establishment of a particular system to share and utilize land information (2-2) Provision of policy support for national land information system
[3] Improvement of the national land management process	(3-1) Improvement of process with particular focus on OTC (creating and acquisition, registration, management of land information) (3-2) Improvement of process with particular focus on CPF (management of cadastral record, utilization support) (3-3) Establishment of work procedure for land information utilization at the local government level (3-4) Establishment of work procedure for land information utilization at the national government level
[4] Enhancement of national land governance	(4-1) Establishment of standard data system on national land (4-2) Establishment of national land software management system and standard technology (4-3) Reestablishment of work procedure on land management
[5] Land informatization at national level	(5-1) Computerization of cadastral map (5-2) Conversion images of cadastral record into text data (5-3) Computerization of data on judgement (5-4) Establishment of database for national land information
[6] Establishment of cadastral management system	(6-1) Characterization of the requirements for cadastral management system (6-2) Design of cadastral data (6-3) Design of cadastral data management system (6-4) Development of cadastral data management system and establishment of related infrastructure
[7] Enhancement of national land management capacity	(7-1) Enhancement of land informatization capacity on OTC (7-2) Enhancement of land survey and performance management (7-3) Enhancement for managing operation system and management system (7-4) Education on land information governance
[8] Establishment of integrated linkage system on national land information	(8-1) Design and plan for integrated linkage system on national land data (8-2) Design and plan for integrated linkage system on national land information (8-3) Development of integrated system and related infrastructure for national land information

〈Table 3-8〉 Continued

Key Issues	Implementation Issues
[9] Enhancement of integrated system on national land information	(9-1) Establishment of enhancement plan for integrated system on national land information (9-2) Development of policy planning to utilize local government (support for facility maintenance, taxation, water supply, and drainage management, etc.) (9-3) Development of policy planning to utilize central government and nationwide service (9-4) Establishment of enhanced integrated system on national land information

Source: Author made from LX interim report about Tunisie land infrastructure renovation master plan.

[Figure 3-8] Example for Ethiopian Land Informatization



Source: Author made based LX interim report about Tunisie land infrastructure renovation master plan

7. Conclusion

Although the history of land policy in Ethiopia started from 1930 and has passed through three political administrations, the country is still among least urbanized countries in sub-Saharan Africa. In the country, land policy has been geared to political ideology of each political administration. Under the current administration, according to the 1995 FDRE Constitution, all urban and rural land in Ethiopia is owned by the public as stipulated in the constitution. In order to make provisions for land use in this context, different proclamations have been issued since 2002, with revision to make the proclamations practical and fit to the changing environment in land.

Recently, the level of urbanization and urban development in Ethiopia has been increasing at an alarming rate. Factors that contribute for urbanization in Ethiopia are: improvements in infrastructure, expansion of industries, rural to urban migration, agro-industries and job opportunities contribute for the fast growth of urbanization. However, the pace of increase in population in urban areas and urban facilities do not match, thus, urban areas of the county are struggling with housing problems and other infrastructural facilities. For successful urbanization, a well-functioning and modernized land administration system is required. Land registration is one of the major elements in land administration and land policy. However, only a small proportion of urban land has legal cadaster in Ethiopia. Thus, effort has to be made to modernize the land registration systems for the fast exchange and access of land use and planning. In Ethiopia, urban land information registration has challenges related to financial constraints, and organizational capacity. For these challenges, the study forwarded policy solutions that were given by reviewing Korean experience.

To formulate a land information system, the study has reviewed Korean land information system and suggested the following for Ethiopia. In 2004, the KLIS integrated two existing systems, which are the LMIS of the MOLIT and the PBLIS of the MOSAPA. This relates to the cadastral administration areas of the city, country and district administration information project and aims to secure data consistency and to enhance user convenience. When its installation was completed in 2006, the system functionality increased leading to client satisfaction and efficiency in national level land management.

Korea has established the KLIS to provide various support systems in one umbrella. These include: land administration support systems, cadastral surveying performance recording systems of 232 local governments across the country, and land management support systems of 15 metropolitan councils, and land policy support system of the ministry of land, infrastructure, and transport (Korea Exim

Bank, 2014). The KLIS has enhanced the utilization of information and convenience by allowing readability between systems and simplifying work processes.

Each local government constructed spatial database including cartographic, cadaster, serial cadaster, edited cadaster, and zoning database, as well as necessary attributes attached to the all the objects of the spatial database.

By digitalizing the process of land administration, the KLIS has brought enormous efficiency. It has led to the improvement of local government civil services' provisions regarding land use. It has also made urban planning more effective. For instance, the KLIS led to a reduction of overloading civil documents. Remote issuing and real time services saved time and money on the part of the civil servants, made available legal information, and shortened civil service processing time from if ten days to a day and at times to a few minutes. About USD 8.32 reducing administration cost because of comprising the existing books saved a million per year.

If Ethiopia adapts all these Korean experiences when setting up its land information system, the country will benefit a great deal in terms of provision of efficient services to the public, thereby enhancing client satisfaction, reducing cost of land administration, supporting the MoUDH to make effective urban planning, and supporting the broader economic development plan of the government.

As such, Ethiopia can set up its own ELIS by integrating administration of land information currently conducted by Ministry of Communication and Information Technology, INSA, and Map Works agency among other institutions. Establishing ELIS will also help local governments avoid pilling of files, and loss of information due to loss of files. In general, it significantly reduces corruption and other malpractices in land areas.

For Ethiopia, it also seems viable to apply the Korean method of land information strategy. The central government plays a leading role in planning and adjusting the ELIS project. Since the local governments do not have the capacity to adjust nationwide issues among local governments such as border-line land registration, it is necessary for Ethiopia to follow the top down approach for the nationwide development of ELIS. If it does not take this approach, the local governments may not take responsibility. In fact, there have been some partnerships between the central and the local governments. Development of this project will be effortless if the central government planned ELIS projects and provided financial resources while the local government participated in the project through matching funds and investigated private sector participation.

In another way, the Korean experience of procurement and share of financial resources in development of land information can be also taken as experience for Ethiopia. For the technical development of cadastral and geospatial data, the KLIS was promoted as a part of administrative information project for the government and all the expenses were covered by the national fund. However, here in Ethiopia, equal share of financial resources with central government at the early stage may not be effective because local governments may not receive sufficient capacity/ financial resources. Consequently, gradual involvement of local government is crucial. Moreover, stepwise development of the ELIS Project, similar to the Korean experience, is needed. This is because the project requires remarkable budget and a large GIS workforce, which must be conducted step-by-step for years. To implement ELIS in the country, serious step wise evaluation of performance and strong commitment is needed.

Besides financial resources, human resource is also vital for establishment of land information system. In this regard, Ethiopia has lagged behind other countries. Consequently, to solve capacity challenge in land registration, encouraging research institutions is needed. Moreover, increasing universities participation in land registration will help the country to solve its capacity problem. In the country, the number of universities is increasing from time to time, so, by encouraging universities to have land management related department, the country can increase the number of trained manpower. In addition, working with countries that have much experience in the area, like Korea, can also solve capacity problem that the county faced and make construction of land information system easy in the country. In addition, giving role for universities for help to establish land information system is needed in the country. In Korean experience, the central government chose the Korea Research Institute for Human Settlements (KRIHS) as the practical backing when launching KLIS.

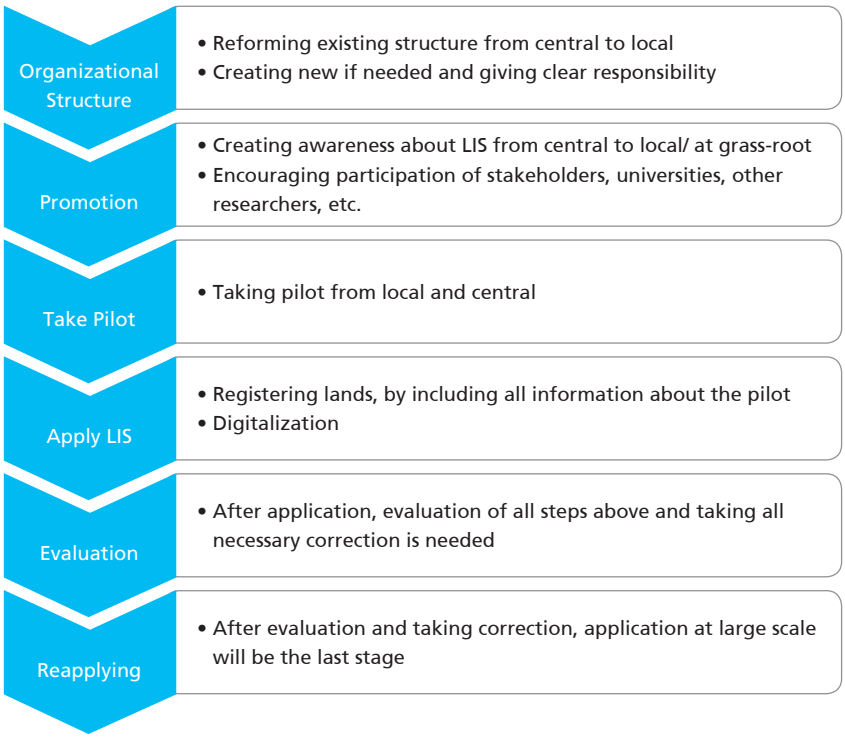
In Korean land information system, the following tasks were the main tasks that helped the country to have best land information system in the world:

- Institutional enhancements for the structure of the land information system
- Database upgrades for the KLIS Establishment
- Establishment of geospatial database
- System design and development
- Foundation of operation management system
- Improvement of Legal Institutions
- Component were promotion and education activity

In the Ethiopian case, these tasks will be at the heart of the country's establishment of an effective land information system. This requires the following

series of steps with careful evaluation of each step. [Figure 3-9] shows detailed steps to be followed in establishment of land information system in Ethiopia.

[Figure 3-9] Steps in Establishing Land Information System for Ethiopia



Source: Author's own contribution.

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Glossary

ANRS	Amhara National Regional State
BPR	Business Processing Reengineering
CSA	Central statistics authority
CSRP	Civil Service Reform Program
EFY	Ethiopian Fiscal Year
EIO	Ethiopian Institute of Ombudsman
EPRDF	Ethiopian People's Revolutionary Democratic Front
EXIM	Export-import
FLPRA	Federal Land and Related Property Registration Agency
GIS	Geographic Information System
GRM	Grievance Redress Mechanism
GTP	Growth and Transformation Plan
INSA	Information Network Security Agency
KLIS	Koran Land Information System
KSP	Knowledge Sharing Program
LHRIA	Land Holding Registration and Information Agency
LIS	Land Information System
LX	Korea Land and Geospatial InformatiX Corporation
LMIS	Land Management Information System
MOLIT	Ministry of Land, Infrastructure, and Transport
MUDHCo	Ministry of Urban Development and Housing Corporation
MoUDH	Ministry of Urban Development and Housing
PAPs	Project Affected Persons
PBLIS	Parcel-Based Land Information System
PGHOs	Public Grievance Hearing Offices
SNNP	Southern Nations and Nationalities and Peoples
ULG	Urban Local Government
USAID	United States Agency for International Development

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