ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES
DEPARTMENT OF EDUCATIONAL PLANNING AND MANAGEMENT

THE PRACTICES AND CHALLENGES OF UNIVERSITY-INDUSTRIAL PARK LINKAGE IN PUBLIC UNIVERSITIES IN ADDIS ABABA

BY

ALEMU WOLDIE

OCTOBER, 2021
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A thesis submitted to the school of Graduate Studies of Addis Ababa University in Partials Fulfillment of the Requirements for the Degree of Masters of Arts in Educational Leadership and Management in Educational Planning and Management

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Approved by the board of examiners:

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Examiner	Signature	Date
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Declaration

I would like to declare that this thesis is my own original work and has not been presented for a degree in any other university, and that all sources of materials used for this thesis have been duly acknowledged.

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Dedication

This research work dedicated to my father Ato Woldie Akele who has instilled me the love of learning by advising me tirelessly that “your fate must not be tied to the piece of land. You better look at the future, not the present”. I also dedicate this study to my mother Woizero Lakech Belew who brought up me with deep love and care. Both of you fought nail and tooth to continue my further education in a distant town. I am in debt of your favor. I have no words but I wish you long live. I am grateful to my dad and mam! Thank you so much.

Acronyms and Abbreviations

AAiT – Addis Ababa Institute of Technology

AASTU – Addis Ababa Science and Technology University

AAU – Addis Ababa University

ETRIIL- Education and Training Research Institutions and Industry Linkage

FDRE – Federal Democratic Republic of Ethiopia

HE – Higher Education

HEI- Higher Education Institutions

IP – Industrial Park

IPDC – Industry Park Development Corporation

MoE – Ministry of Education

MoU – Memorandum of Understanding

OECD – Organization for Economic Cooperation and Development

R and D- Research and Development

RTD – Resource Dependency Theory

TVET – Technical and Vocational Education and Training

UIL – University-Industry Linkage

U-IP – University Industry Park

UIPL – University Industry Park Linkage

UNIDO – United Nations Industry Development Organization

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Abstract

The purpose of this study was to investigate the practice and challenges of university-industrial park linkage in public universities in Addis Ababa. The site of the study was Addis Ababa Institute of Technology-AAU and Addis Ababa Science and Technology University. To this effect, both primary and secondary data sources were used. A set of questionnaires and key informant interviews were also employed. School/college deans, department heads, chairs and instructors have filled in the questionnaires. Besides, interviews were conducted with university-industry linkage office directors, Industrial Park Development Corporation and Industrial park representatives to consolidate the quantitative data. Simple random sampling method was used to select the instructors and purposive sampling technique was applied for the other respondents. Likewise, descriptive survey research approach was used. Moreover, the study used mixed methods to triangulate the information gained by quantitative and qualitative data. The information obtained through quantitative data, questionnaires, was analyzed using descriptive statistics and independent sample t-test using SPSS version 24 (at alpha = 0.05). The responses gathered through interviews presented with descriptive and narrative statements. The major findings of the study indicate that the universities had limitations to plan, implement and evaluate the UIL plan jointly. The stratum of the linkage between the universities and industrial parks was found at infant stage which is below the required level. There was gap in aligning the skills of graduates and the needs of industrial parks. The local universities have limitations in their capacity to get the trust and confidence of the industrial parks. The efforts made by the university academic staff were not well coordinated and systematized. In turn, the industrial parks lack willingness to interact and to disclose their researchable problems to the universities. The dominant barriers that affect the linkage were poor communication, program misalignment, inadequate leadership support, lack of competitiveness among industries and participatory leadership, absence of guidelines, lack of need assessment, follow up and incentive mechanisms. The existing coordination among government, university and industry can be categorized as laissez fair model configuration. To realize effective linkage between the universities and industrial parks, the universities advised to focus on win-win strategies and attract the industrial parks to enhance the sense of initiative and strive to get the trust of industrial parks. Therefore, the universities should enhance involvement of the people of industrial parks in UIL plan, and other related key linkage activities. On the other hand, the industrial parks shall be willing and open their doors to interact with the universities ultimately to realize mutual benefits. Besides, the government bodies are expected play a pivotal role in the formation of triple helix model of interaction among the government, the universities and industrial parks. It is also expected to narrow the gaps that limit the linkage.

Key words: University-industry linkage, Industrial parks, university and opportunity.

CHAPTER ONE

INTRODUCTION

This chapter deals with the fundamental issues of the research and the reasons for carrying out the study. The topics presented in this part of study are background of the study, statement of the problem, objectives, significance, limitation, and delimitation of the study, operational definition of key terms and organization of the study.

1.1. Background of the Study

The techno-socio-economic interdependency of the global world has been growing faster and faster since the first industrial revolution. Particularly after the second half of the 20th century, the world has shown dramatic advancement in scientific, technological and economic progress (Haile Gabriel, 2019). In the process of techno-socio-economic development, two of the major determinant actors are higher education institutions and industry sectors. In this regard, higher education institutions have been recognized as the potential tower where knowledge and skills are created, accumulated and transferred to the users. Concerning this, as noted by Wondwosen (2014), World Bank (2002) stated that the realization of knowledge by itself does not bring economic transformations unless it is applied to solve the existing problem. Knowledge can be accumulated, transferred and produced through a variety of ways.

Knowledge production involves variety of approaches of generating knowledge and of accumulating them, more actors who come from different disciplines and backgrounds, but above all different sites in which knowledge is being produced(Gibbons, Limoges, Nowotny, Schwartzman, Scott and Trow, 2010). In the contemporary world, the global world has been becoming closer and closer than ever in the history of mankind. In one hand there is collaboration among individuals, organizations and countries. Conversely, these actors has been competing one another to survive and get more profit and recognition from the global society. As noted by Ssebuwuf, Ludwick and Beland (2012), universities are recognized as essential contributors to economic development by producing the knowledge, skills, and innovations to the economies.

It is also undeniable that the expansion of higher education institutions triggered the formation of links with industries. In addition to this, no one organization is self sufficient but they are obliged to establish resource dependency with the other actors, entities and organizations in order to survive and function (Johnson, Bob L., Jr., 1995). Moreover, the unequal distribution of resources (such as raw materials, capital, human capital, information, technology and technological innovations and social capital) forced the existence of exchange and power relations among. The above scenario indicates that neither the universities nor the industries stand alone. Rather than they are complementary one another to insure their mutual benefits. As a result, the higher education proclamation (2011) noted that "every institution shall have the responsibility to forge linkage with industries for mutual benefits". In this regard, universities produce skilled manpower and the industries consume the produced labor force to improve their productivity, profitability and competiveness. Therefore, the linkage between the universities and the industries play a critical role not only in enhancing the teaching-learning process at universities but also in improving the productivity, competitiveness and profitability of industries and the development of the nation.

Globally, the university-industry linkage practice goes back to centuries and has been played as a driving economic development in well developed countries where as it is a recent issue in developing counties. According to Abdu (2013), different countries had different approaches and experiences of university –industry linkage. For instance, Belgium has organized research and development center focusing on consultancy services, contract research, patents, spin-offs and research parks collaborating with industries. Similarly, as noted by Abdu, Altbach, et al., (2009), in Germany, students have access to get internship, employment, scholarship, and some financial support. Likewise, in China, universities have the potential to generate internal income and research funds using technological transfer and consultancy services.

However, a number of universities found in Africa could not escape from the critic due to lack of effective linkage with the industry and inability to produce qualified and skilled graduates. An empirical study done by Ssebuwufu, et al., (2012) suggested that *there is a growing perception that the knowledge and skills acquired by students at African universities do not meet the requirements of industry and the wider economy.* Further to this, the study also remarked that the

skills and knowledge received by students' at a number of African universities do not qualify them adequately to meet the demands of the industry.

Ethiopia has been trying to enhance the relevance of higher education to the demands of the country by enrolling 70 percent under graduate students in science and technology program (Haile Gabriel, 2019). To this end, the country has been constructed over twelve industrial parks in addition to the existing other industries for the last few years to realize sustained economic development. The establishment of these industrial parks may serve as a site for university-industry linkage. However, different studies reported that the linkage between the universities and industrial parks are not as desired. In relation to this, Salmi, Sursock and Olefir (2017) stated that the industrial parks were built near the first and second generation public universities; nevertheless, universities are not fully engaged with industry to achieve their own goals. This study, therefore, tried to examine the practices and challenges of university-industrial park linkage in public universities in Addis Ababa.

1.2. Statement of the Problem

The linkage between the universities and the industry sectors helps to utilize the accumulated knowledge and resources so as to benefit the major actors of linkage namely, university, industry and government. However, different studies (Daniel, 2008; Martin, 2000) shows that the linkage between universities and industries are not fully utilized in many African universities as compared the developed and newly developed countries. A study conducted by Ssebuwufu, et al. (2012) reported that *African universities have been criticized as ivory towers that churn out graduates that do not meet the needs of industry and the socio-economic and technical challenges facing African economies.*

Ethiopia has hugely been investing in higher education. For instance, in 2020-21 fiscal budget year education holds the second highest spending budget allocation at Birr 56.8bn with funding in this line-item allocated to 47 federally administered universities for an average of Birr 1.2 billion per university (Micro Research Ethiopia, 2020). Nevertheless, in Ethiopia, the university-industry linkage is not far beyond the level of signing memorandum of understanding (STEP-GIZ/MoE, 2018). Besides, Wondwosen (2014) criticized that the Ethiopian universities have

been lagging behind in establishing effective linkage with industries. Similarly, MoE (2017) also documented that *the existing university-industry linkage was found inadequate hence students did not have ample exposure to real-world of work as well as the teaching of practitioners from industry.*

Likewise, in Ethiopia, the education offered for a century had limited positive impact on the lives of the society and national socio-economic development (MoE, 2002). Moreover, the "Engineering education has been effective for more than sixty decades; nevertheless, it cannot enhance the county's development as desired" (St. Mary's University College, 2013). Furthermore, Daniel (2008) explained that… *While it is essential for R and D institutions to establish a close relationship with the productive sector, effective linkage are often lacking*.

In addition, the Ethiopian Business Review (2017) and Salmi, et al., (2017) indicated that the university-industry linkage remains loose and universities were not properly engaged and it has affected industries from improving their competitiveness due to they are not getting skilled manpower and technologies to improve productivity, the universities in turn are also producing research less consumed by the industries they aim to serve. Similarly, a study done by Ayenew and Teklay (2017) suggested that the linkage between university and industry is limited in specific areas such as students' internship and consultancy services. Likewise, Wondwosen (2014) pointed out that the existing status of university-industry linkage in Ethiopia is yet at its rudimentary stage of development.

On the other hand, Abdu (2013) noted that the result gained from the university-industry linkage did not bring significant change even though efforts have been made to increase the provision and utilization of engineering education at higher institutions. In contrast, Ethiopia aspires to become a lower middle income country by the year 2030. To attain this ambition, a lot of reforms have been done. To enable the education sector to support this broad goal, the government set the admission ratio called 70:30 i.e. the placement of 70% students in technology and natural science and 30% in social science and humanities (Haile Gabriel, 2019). This admission ratio may not attain its objective without close links between the universities and the industries and relevant research out puts. Moreover, in Ethiopia, much attention has given to the

theoretical aspect than practical opportunity to improve the skills of the students at universities (The Reporter Magazine, 2020).

The researcher of this study had faced similar experience while attending undergraduate program in engineering field in one of the public university. Due attention was given to the theory than providing practical exposure outside the university except lab experiments. This was a manifestation of the knowledge and skills that students acquired at universities lagging behind meeting the needs of the industry. The mismatch between what students learn and what the industry requires is blamed for the emerging high graduate unemployment and under-employment are witnessing (Ssebuwufu et al., (2012) and Daniel (2008).

The annual increment of graduates that entered to the job market and the inability of graduates to get or create jobs has been adding salt to the wound for the emerging socio-economic chaos. In light of this, a survey made on urban employment-unemployment by the Ethiopian Statistical Agency, cited by The Reporter Magazine (2020) youth unemployment in urban area reaches 25.3 percent by 2018. As Haile Gabriel (2019) noted the number of graduates and the available jobs do not match since the job market saturated. In recent times, the government recommended that the graduates not to waste their time in searching white-collar job either in government or private sectors. The officials advised graduates to create their own jobs.

But there is big question behind this advice i.e. do the graduates acquired the skills, knowledge and attitudes to create their own job and to become self-employed? Surprisingly, in Ethiopia, large firms and companies owned by foreigner investors view skills as one of the binding obstacles to their operations (Salmi, et al. 2017) for instance a survey conducted by the World Bank indicated that 93 % of all professional positions and 67 % of skilled workers' position in these firms are held by foreign employees. Ginger and Moller (2015) and Salmi, et al. (2017) noted that the manufacturing sector in Ethiopia stumble to recruit candidates who acquired both appropriate technical competencies soft skills and conducts such as work on the other ethics and commitment. The issue of unemployment in one hand and the quality of graduates seems contradictory and controversial.

In addition to this, empirical studies conducted in Ethiopia emphasized on the signing of memorandum of understanding and some forms of linkage such as internship, educational visit, training and the like. In recent times, a number of industrial parks have been constructed in different corners of Ethiopia to meet few objectives. However, according to the preliminary assessment of this researcher, studies conducted on the linkage between the university and industrial park was almost none. Thus, the reason to carry out this study was to assess the practice, challenges and seek solutions for the challenges of university-industrial park linkage.

Moreover, the issue of graduates skills and knowledge gap, the needs of industries, the linkage between the universities and the industries and the mismatch between the skills acquired by graduates at universities and the demands of industries was a big deal and under question. In general, all these issues require the need for conducting further study to examine the linkage between universities and industries and find ways to alleviate the existing challenges. The purpose of this study is, therefore, to investigate the existing practices and challenges of the university-industrial park linkage at Addis Ababa Institute of Technology-Addis Ababa University and Addis Ababa Science and Technology University. Thus, the study extended its effort to answer the following overarching research questions.

1. To what extent does the university-industrial park linkage exist?
2. What types or areas of linkages do exist and what benefits have been obtained from the university-industrial park linkage so far?
3. What are the major challenges that hinder the university-industrial park linkage?

1.3. Objectives of the Study

General objective: The aim of this study is to identify the existing practices and challenges of university-industrial park linkage and to seek ways that can pave ways for the formation of skilled manpower that meet the needs of industries in particular and contribute for the socio-economic development of Ethiopia in general.

Specific objectives: To achieve the general objective stated above, the study intended to:

1. Identify the areas of linkages exist and the benefits obtained from the university-industrial park partnership.
2. Assess the extent to which the university-industrial park linkage does exist.
3. Explore the challenges that impede the university-industrial park linkage.

1.4. Significance of the Study

The Ethiopian government has been taking progressive initiatives and efforts on constructing industrial parks every corner of the country. One of the aims of these industrial parks is to transfer the technology to the local higher education institutions and other stakeholders. To achieve this goal, the linkage between the universities and industrial parks are important tools for the intended technology transfer. However, the linkage between the two actors (university and industrial parks) was short of expectation to achieve the proposed objectives. Similarly, the researcher of this study identified that studies conducted on the university-industrial park linkage seemed none.

Therefore, conducting this study enable to understand the current practices and challenges of the university-industrial park linkage. Likewise, the findings of the research may help universities, governmental bodies, policy makers and industrial parks to make informed decisions and actions regarding the university-industrial park linkages so as to produce qualified graduates and to meet the needs of industrial parks in particular and the industry in general. Moreover, this study may contribute to the field of knowledge through filling the existing literature gaps on the area of university-industrial park linkage. Lastly, but not certainly the least, the study may also contribute to provide new insights and may initiate other researchers to conduct further studies on the area.

1.5. Delimitation of the Study

If the universities (public and private) and industrial parks found in Ethiopia included in this study, the findings of this research can be generalized for the wider universities and industrial parks. This study, therefore, focused on the linkage of Addis Ababa Institute of Technology (AAiT) and Addis Ababa Science and Technology University with Bole Lemi and Kilinto Pharmaceutical and Medical Equipment Industrial Parks. The reason for selecting the two universities was mainly due to the focus programs that the two universities run engineering education.

University-industrial park linkage may exist in various educational fields of study other than in engineering fields. However, the boundary of this study was limited to linkage between the public universities offering engineering fields, applied science and industrial parks and much emphasis was given to the university side since universities are the front line to initiate partnership with industries. Thus, the conclusion of the study confined to the two universities focusing on investigating the linkage practice, the benefits gained from the linkage, the areas of linkage, and the challenges that exist, the efforts made to strengthen the linkage and solutions to alleviate the challenges from both sides (university and industrial parks). The findings and recommendations of this study may not indicate and be applicable for other public and private universities and industrial parks and other industries.

1.6. Limitation of the Study

It is illogical, nonrealistic and unmanageable to include the whole population in conducting a research particularly for large population size. Selecting two universities among the four public universities and other private universities located in Addis Ababa could be considered as one of the short comings of this study. In addition to this, the other limitation of this study was that it did not consider the universities students' comments and opinion about the topic due to financial and time constraints. This may affect the holistic representation of the sample. Moreover, paying attention for proportional representation of gender is advised in research works; however, the participation of females in this study was very limited due to lack of female academic staff. In short, this influenced representation of female academic staff in this study. Besides, there was

lack of empirical studies conducted on the research topic that may affect the results of this research. The researcher of this study has tried to use mixed research designs involving quantitative and qualitative research approaches to get valid information so as to minimize the gaps raised above.

On the other hand, during collection of data few respondents were hesitating to provide information and still others had information gap to give the actual data or information. Similarly, due to the outbreak of COVID-19 pandemic, respondents were not able to participate in focused group discussion so as to get further information about the issue. Additionally, few respondents were rushed out in filling the open ended questions and nearly 14 percent respondents were not willing to fill and return the questionnaires. Furthermore, financial and time constraints were other factors to investigate the study in-depth and breadth. The limitations described above were the shortcomings of this study which may affect the findings of the study.

1.7. Definition of Terms

1. **University-industry linkage:** refers a system through which HEI and /or its academic staff interact with industry for mutual benefit. This can be realized through joint research, contract research, research grant, consultancy, community engagement, staff mobility, joint supervision of students, student internship, staff externships, cooperation in education, training of industry staff at higher education institution and lecturing by industry staff (Education and Training, Research Institutions and Industry Linkage (ETRILL) Regulation Number ----/2020) (It is under process for approval. As aresult no regulation number stated)
2. **Industrial parks:** is a tract of land developed and sub-divided into plots according to comprehensive plan with the provision of roads, transportation and public utilities, sometimes also with common facilities, for use by a group of manufacturers (UNIDO,2019).
3. **University:** As the higher education proclamation No. 650/2009 of Ethiopia under article 11.1 indicated, it is **"**an institution which has a minimum enrollment capacity of 2, 000 students in regular undergraduate and graduate programs in at least three academic units

larger than departments, or that has minimum enrollment capacity of 2,000students in regular undergraduate programs in at least four academic units larger than departments"(FDRE,2009).The term university and higher education or higher education institutions used interchangeably for this research.

4. **Opportunity:** are any socio-economic advantages happened following the presence of industrial parks (Yechalework Aynalem, 2019).

1.8. Study Area

The sites of this research were Addis Ababa Institute of Technology (AAiT), Addis Ababa Science and Technology University (AASTU), Bole Lemi Industrial Parks.

1.8.1. Addis Ababa Institute of Technology (AAiT)

Addis Ababa Institute of Technology is the new name for the first institution teaching engineering education in the country. Initially, it was named the Imperial College of Engineering. It was established in 1953. At the beginning, the college opened two-year intermediate engineering programs. Subsequently, the students were sent abroad for a further study leading to a B.Sc. degree. In 1958, a four-year degree program in civil and industrial engineering was launched. In the following year, the industrial engineering program was split into electrical and mechanical engineering programs, and the duration of the study for all programs was extended to five years. In 1961, the college became a chartered member of Addis Ababa University and expanded further in 1963 by opening the Department of Architecture and Urban Planning

In 1965, the college moved from its former location in the compound of the Technical School at Mexico Square (the now Tegbare-Id) to the Arat Kilo Campus (the current College of Natural Sciences). In the following year, the college then moved to its present campus. The new campus was constructed by the financial assistance of the Federal Republic of Germany. The former Ethio-Swedish Institute of Building College, the College of Engineering and the Building College merged to form the Faculty of Technology in 1969.

For the last six decades, Faculty of Technology of Addis Ababa University has been educating. The Faculty of Technology used to admit 200 – 250 students per year. Eight years back, the Ethiopian government has introduced new educational policy whereby the student admitted to tertiary education would be 70 % Science and Technology, and 30 % social sciences, business, economics, and humanities. In this ratio, the engineering and technology contribution is expected to be on average about 40 % of the student population in the undergraduate programs. This was introduced to create engineers and scientists needed to speed up technology transfer and innovation in order to bring the transformation and fast growth in the Ethiopian economy

In order to effectively manage the large student population and swiftly respond to the need of the government transformational plan and support the growth and competiveness of the industry, the Faculty of Technology was given autonomy and new leadership with international experience since April 2010. The Faculty of Technology was re-organized into Addis Ababa Institute of Technology and the leader of the Institute is named as Scientific Director, with Vice President Status of the university. The new institute was officially inaugurated in October 2010

The institute is the largest engineering institute with better staff profile as compared the other thirty two public universities in the nation. For young PhD holders and researchers returning from aboard, it is a very preferred environment to work in. It does still play critical role in supporting engineering education in most of the universities across the nation and beyond. It trains instructors of other universities and delivers courses as visiting professors in their programs. Thus, the quality of education and research at AAiT reflects the national strengthen and weakness in creativity, innovation and entrepreneurial culture

It located in Addis Ababa in front of the National Museum. Addis Ababa Institute of Technology (AAiT), which was established before 60 years ago, is the leading Institute of Technology in Ethiopia. At present, it is functioning with special autonomy from Addis Ababa University. It has a supervisory board, which is the highest governing body. The Institute is led by a Scientific Director with the rank of University Vice President. Source: (http://www.aau.gov).

Vision of AAiT:

AAiT aspires to be among the top five African pre-eminent Technological Institutes by 2023.

Mission of AAiT:

To educate competent graduates and researchers in Engineering and Technology by advancing relevant, innovative and creative teaching, research and Technology Transfer to foster social and economic development of the country.

Values of AAiT:

1) Academic Freedom
2) Excellence in Engineering and Technology
3) Ethical Conduct
4) Intolerance to Corruption
5) Respecting Diversity
6) Reliance on Evidence and Authority of Reason
7) Student Centeredness
8) Entrepreneurial spirit
9) Social Responsibility

1.8.2. Addis Ababa Science and Technology University(AASTU)

Addis Ababa Science and Technology University was established to serve as a cornerstone to build an economically developed and industrialized state of Ethiopia. As a result, AASTU was founded in 2011 under the Directive of the Council of Ministers No. 216/2011 in November 2011. The main campus is located in Addis Ababa in the current Akaky Kaliti Sub-City, Kilinto area. The university is named as university for industry. Source: https://en.wikipedia.org.

Vision of AASTU:

To be internationally recognized Ethiopian hub of science and technology with strong national commitment and significant continental impact by 2025.

Mission of AASTU

1) Delivering world class education and training in strategically priority science and technology disciplines based on national economic demand,
2) Conducting problem-solving applied research to support the productivity and competitiveness of industries
3) Serving as a center for knowledge and technological adaption, innovation and transfer
4) Building technical and managerial capabilities of industries and
5) Become a national hub of science and technology.

Values of AASTU:

Core values of AASTU are:

1) Advocacy
2) Honesty
3) Expertise
4) Independence
5) Loyalty
6) Fairness

1.8.3. Bole Lemi Industrial Park

Bole Lemi Industrial Park is located in the Addis Ababa. It is the first industrial park established by Industrial Parks Development Corporation (IPDC). It was funded in 2014 and focused on the clothing and apparel sector aiming to export the products to abroad. Its first phase covers an area of 187 hectares. Inside the industrial park there are 23 modern industrial sheds. Source; Source: https://en.wikipedia.org.

1.9. Organization of the Study

This study has five chapters. The first chapter deals with the background of the study, statement of the problem, objectives, significance, delimitation, and limitation of the study. The second chapter presents the literature review. The third chapter is about research designs and methodology. The fourth chapter deals with data presentation, analysis and discussion. The last chapter consists of summary, conclusion and recommendations.

CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

In this chapter, the fundamental concepts and previous studies conducted in the area of university-industry linkage are presented. It is very essential to review the theoretical aspects and related literatures concerning the central issue of the study so as to point out what has been done so far, what gaps do exist and what should be done in the future. Having this in mid, the study has reviewed some theories and previous research works in relation to the practices and challenges of university-industry linkage.

To this effect, human capital theory, the concept of triple helix model, concept of industrial park, some global scenario, benefits , Ethiopia's experience, mechanisms and factors of UIL, the efforts that have been done so far and conceptual frame work of the study are discussed in detail under this chapter.

2.1. Human Capital Theory

2.1.1. Foundation and Concept of Human Capital Theory

The classical concept of human capital was probably introduced in around 1676 by Sir William Petty and in 1776, after a hundred years, Adam Smith wrote briefly the role of human capital in his work of 'Inquiry into the Nature and Causes of the Wealth of Nations' (Machlup, 1982). Along with this, different scholars at different time had been contributed for the development of modern human capital theory.

As noted by Schultz (1961) the concept of human capital encompasses the skills, knowledge, and similar attributes that affect the human capabilities in order to accomplish productive work. In similar way, OECD (2001) defined human capital as the knowledge, skills, competencies and other attributes embedded in individual critical to enhance personal, social and economic development. It implies that, human capital constitute an intangible stock of asset which is helpful to facilitate the creation, application, productivity and employability (Jeilu, 2008).

On the other hand, Armstrong (2012) defined human capital as the knowledge, skill and intellectual ability that individuals generate, retain and apply. Moreover, as Alika, Joseph and Aibieyi (2014) explained, the abilities of individuals can be enhanced by education and training. Furthermore, Golden (2014) defined human capital as **"**the stock of productive skills, talents, health and expertise of the labor force, just as physical capital is the stock of plant, equipment, machines, and tools**."**

2.1.2. The Roles of Universities in the Formation and Development of Human Capital

There are three forms of education namely: formal, informal and non-formal education. Universities are places where mainly formal and non-formal forms of education take place for the formation and development of human capital. In addition to this, the process of acquisition of intangible stock of capital (for example, knowledge and skills) is lifelong and life wide activity (OECD, 2001). This indicates that universities are not the only places where formation and development of human capital. However, they can be considered as the fundamental sources of human capital. Besides, HEIs are at the front lines and play a critical role in improving the quality of education that in turn contributes for socioeconomic development of a country (Abdu, 2013). Moreover, as Abdu (2013) remarked that universities support the industry sector by producing qualified graduates, providing consultancy services and producing advanced technologies that bolster the competitiveness of universities in the global market system.

According to, Tittenbrun (2017) explanation "the 'knowledge and skills' definition focuses attention on the contribution of education and training to a person's human capital formation." In this regard, human capital formation is about generation, accumulation and use of knowledge and skills. The components of human capital formation are a combination of natural ability, innate and acquired skills, experiences, talent and inventiveness (Alika, et al., 2014). Therefore, higher education institutions have heightened responsibilities in the generation, accumulation and application of skills and knowledge through combining the components of human capital (ability, innate, talent etc.).

In relation to human capital formation, Schultz (1961) identified five activities in enhancing the capabilities of human. These are health, on-the-job training, formal education, study programs and migration of individuals. Along with this, Jeilu (2008) suggested as education (formal, informal and non-formal education), health, firms, individual's choice and social actions are factors to facilitate the formation of human capital. On the other hand, innate ability, schooling, school quality and non-schooling investment, training and pre-labor market influences are sources of human capital (LaMotte, No date). Concerning knowledge, Lundvall and Johnson, as cited by OECD (2001) classified knowledge in to four categories as described know-what refers about facts, know-why shows about principles and laws in nature, know-how refers to skill and know- who indicates ability to cooperate and communicate

Conversely, John W. Kendrick, cited in the work of Machlup (1982) categorized capital formation in to four. These are non-human tangible such as construction, machinery and inventory, human tangible like rearing of children to working age, non-human intangible such as research and development and human intangible like education, training, health, safety and mobility of people.

In general, communication skills, intra and inter personal skills, numeracy and other skills are the key skills and individual characteristics important for the formation and development of human capital (OECD, 2001).Indeed universities play an important role in cultivating the communication and intra and inter personal skills. However, human capital is subjected to deterioration when it is idle due to unemployment impairs the acquired skills and knowledge (Schultz, 1961). For example, Jeilu (2008) stated that the rise in due to the shifts in the kind of skills and up grading skill level deteriorates the skills of employees acquired in the past. Obsolescence of human capital caused by either technical obsolescence of human capital which is resulted from natural aging, illness or injuries, unemployment career interruption or economic obsolescence of human capital may resulted by change in work environment such as technological and organizational changes.

2.1.3. Classification of Human Capital

Different scholars classified human capital in various ways. For example, OECD (2009) classified human capital in to three categories. The first one is general human capital- generic not specific to a task or an organization. The second category is firm-specific human capital- rarely to apply to other firms and the third is also task-specific human capital- very specific to a given task in a given organization. Hence, the general human capital can be transferred across jobs, firms and industry. Conversely, the specific human capital is difficult to transfers to different industries. In the same way, Becker& Gray (1964) categorized human capital as general and specific.

According to Becker, general human capital refers to skills and knowledge acquired by an individual the productivity in any firms. In contrast, specific human capital uses the productivity of the individual only in the current job. Contrary to the classification of human capital as general and specific, Tittenbrun (2017) argue that as there is no clear and neat distinction, accordingly, "some types of training are neither general nor specific nor the sum of general and specific components." Moreover, if training is transferable, both the firm and the worker have some kind of incentives to invest in it.

2.1.4. Measurement of Human Capital

The measure of human capital stock can be largely categorized into three classifications: output, cost, and income-based method. For instance, enrollment rates, scholastic attainments, adult literacy, and average years of schooling are the examples of output-based approach whereas cost-based method is calculating costs paid for obtaining knowledge; and income-based approach refers individual's benefits obtained by education and training (OECD,2009). Moreover, the document indicates that educational attainment, enrolment indices, adult skills, earning streams, market value of human capital and weighted skill index are approaches to estimate human capital stokes.

2.1.5. Demand for and Impact of Human Capital

The misalignment between the demand and supply of human capital can be manifested by under-qualification and over-qualification (OECD, 2001). In addition to this, (Lamotte, no date) suggested that the quality and availability of human capital accelerates the creation of better jobs and strengths social cohesion. For example, economic growth demands much internal migration of workers in order to adjust to changing job opportunities (Schultz, 1961).Furthermore, Schultz stated that "the man without skills and knowledge leaning terrifically against nothing." An organization that de-emphasize on the training and development of its labor force, is tilting towards a state of collapse (Alika et al., 2014). On the other hand, (OECD 2001) offered key contribution of human capital. Accordingly, better educated people; gain better earning, tend to be healthier, lower crime, enhances productivity and contribute for economic growth and development.

2.2. The Concept of Triple Helix Model

The triple helix is the spiral model of knowledge production that encompasses multi reciprocal interfaces to enhance the socio-economic development (Etzkowitz, 2002). As explained by OECD (2013), a triple helix relationship is helpful to facilitate the co-operation between university, industry and government ultimately to boost innovation. Synergy between the innovation actors determines the existence of innovation systems. In addition to this, "the triple helix thesis states that the university can play an enhanced role in innovation in increasingly knowledge-based societies" (Etzkowitz and Leydesdorff, 2000). In a knowledge-based economy, OECD (2013) the generation of insists on the interface exist between the three major actors of the economy: university, industry and government. As (Etzkowitz, 2002 and OECD, 2013) pointed out, the development of triple helix interactions involve bottom up, sideways, diagonal and top down. The nature of society has changed from impermeable boundaries between separate organizations to more flexible overlapping systems in which each playing the role of the other (Etzkowitz, 2002). Nevertheless, in implementing triple helix interface effective communication between the university-industry –government is the major challenge (OECD, 2013). To sum up, Etzkowitz (2002) pointed out three major conceptual frameworks which are based on nested ideas. These are knowledge space refers the creation of regional innovation environment,

consensuses space generation of ideas and strategies from a triple helix linkages, and innovation space realizing goals, experiments public venture capital.

2.2.1. Triple Helix Configurations

There are three main typologies of triple helix namely: statist, laissez fair and triple helix models (Etzkowitz and Leydesdorff, 2000, OECD, 2013, Etzkowitz, 2002).

1) **Statist Model:** In statist configuration, the government dominates other spheres and leads the interfaces of the two actors (Etzkowitz and Leydesdorff, 2000). In this model, (OECD, 2013) the government organizes regional research institutes. Etzkowitz and Leydesdorff (2000) suggested that statist configuration provides too little room for bottom up initiatives. In similar vein, as Etzkowitz (2008) noted a triple helix coordinated entirely by the government only take initiatives without consulting the university and industry.

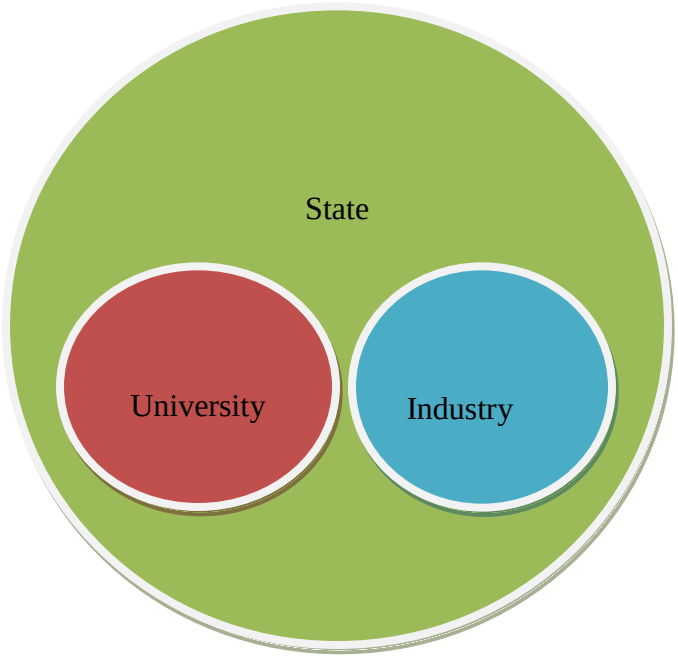


Figure 2.1: Static model: Source: Etzkowitzand Leydesdorff (2000)

2) **Laissez fair Model:** As OECD (2013) noted, in laissez fair model institutional spheres functions separately with demarked boundaries. As a result, it is seen as shock therapy to

minimize the intervention and the role of the government (Etzkowitz and Leydesdorff, 2000). Therefore, the role of the government is limited to the harmonization the market systems (OECD, 2013). It looks like the following diagram.

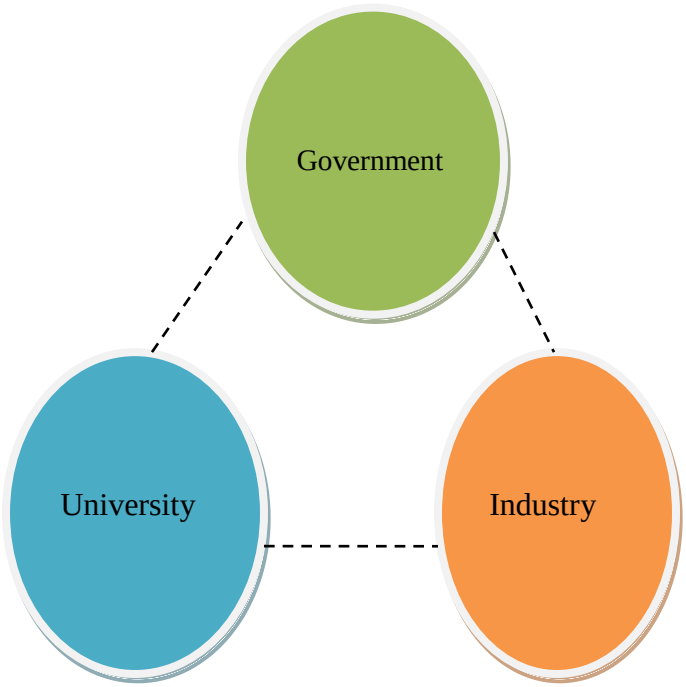


Figure 2.2: Laissez-faire model (Source: Etzkowitzand and Leydesdorff (2000))

3) **Triple Helix Model:** Interface among university-industry-government, is the key to improving the conditions for innovation in a knowledge-based society (Etzkowitz, 2008). In this regard, Etzkowitz and Leydesdorff (2000) explained triple helix as it is generating a knowledge infrastructure through overlapping sphere in which each taking the role of the other. According to Etzkowitz (2002) triple helix model encompasses multi reciprocal relationships.

In the triple helix model, the first dimension is internal transformation, the second is the influence of one helix upon another and the third is the creation of a new overlay of trilateral networks and organization. In short, it encompasses trilateral relationships between university, industry and government.

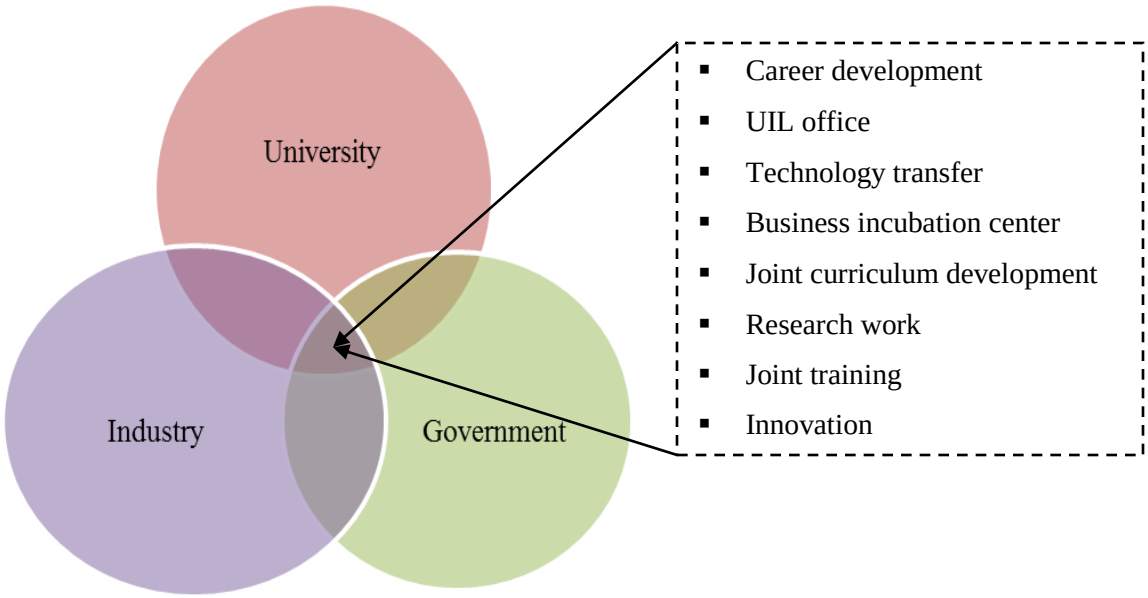


Figure 2.3: Triple Helix model (Source: Source: Etzkowitz and Leydesdorff (2000))

2.3. Resource Dependency Theory (RDT)

In the era of globalization, an organization is dependent on another organization in order to survive and function ultimately to meet its goals and objectives. According to Johnson, Bob (1995) Resource Dependence Theory (RTD) is a theory that seeks to explain organizational and inter-organizational characteristics in terms of critical resources. Resources of different kinds are essential for sustainable survival and success of an organization. No organization is independent and self-sufficient and resource exchanges are very important.

2.3.1. Basic ideas of RDT

As Nienhuser (2008) resource dependence theory postulates that the environment provides crucial resources needed by the organization. Moreover, Nienhuser pointed out that whoever controls resources has the power over those who need these resources and actors who controls a large part of critical resources need are relatively powerful. The unequal distribution of resources obliged organizations to exchange materials, knowledge, skills and attitudes.

There is an inter-dependence and connection between organizations to survive and function sustainably. The following free body diagram reflects the connection between environment, organization and organizational actions.

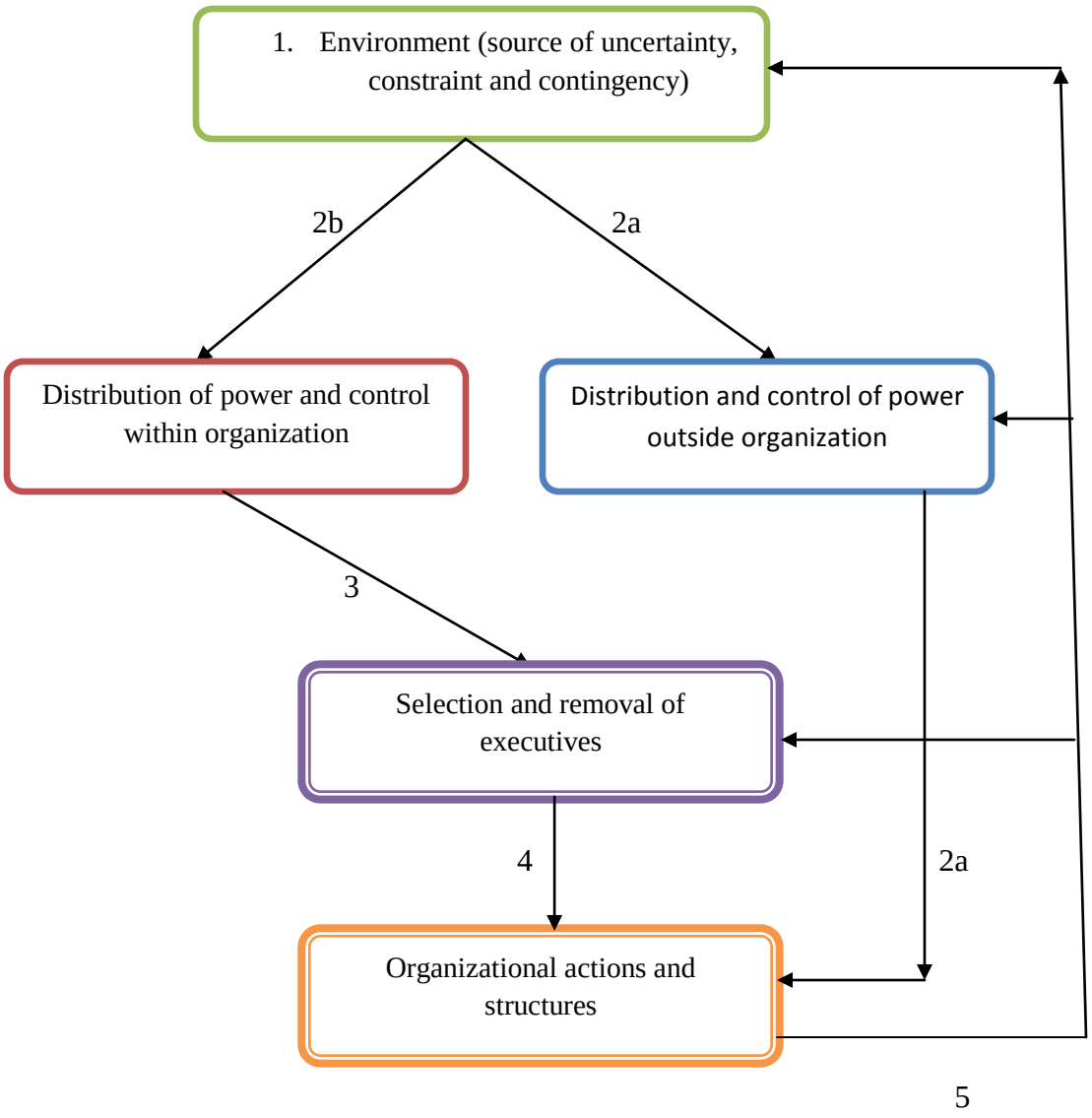


Figure 2.4: Connection between environments, organization, organizational actions (adapted from Nienhuser, 2008)

2.4. The Concept of Industrial Park

2.4.1. Definition of Industrial Park

The term industrial park has different names in different literature for instance it is named as Industrial zone, Special Economic Zones, Eco-Industrial Parks, Free Trade Zones, Technology Parks, Industry Clusters, Export Processing Zones, Economic Development Zones, Innovation and so on (UNIDO, 2019 and OECD, 2009).

The term industrial park refers to "a tract of land developed and sub-divided into plots according to a comprehensive plan with the provision of roads, transportation and public utilities, sometimes also with common facilities, for use by a group of manufacturers (UNIDO, 2019). It consists of a broad range of concepts, like free-trade zones, export processing zones, special economic zones, high-tech zones, free ports, enterprise zones (UNIDO, 2019).Similarly, according to the Ethiopian Industrial Park Proclamation No. 886/2015 industrial park is defined as follows:

> *Industrial Park" means an area with distinct boundary designated by the appropriate organ to develop comprehensive, integrated, multiple or selected functions of industries, based on a planned fulfillment of infrastructure and various services such as road, electric power and water, one stop shop and have special incentive schemes, with a broad view to achieving planned and systematic, development of industries, mitigation of impacts of pollution on environment and human being and development of urban centers, and includes special economic zones, technology parks, export processing zones, agro-processing zone, free trade zones and the like designated by the Investment Board (FDRE, 2015)*

2.4.2. Fundamental Characteristics of Industrial Park

As shown below in table 3.1, there are various type industrial parks which slightly differ from one another. However, all types of industrial parks share some common characteristics. As UNIDO (2019) documented the basic characteristics of industrial parks are:

1) **Geographically-delineated tract of land**: that includes services such as utilities, telecommunications, industrial waste and wastewater treatment, landscaping, emergency

services for firefighting and first aid, security and access to transportation and other public and private services.

2) **Detailed master planning**: that prescribes standards and specifications for all aspects of the built environment, including buildings.
3) **Single management or administration entity**: to approve and accommodate the entry of new companies into the park, enforce compliance with its rules, and to provide forward planning to promote the long-term development of the park.

2.5. University-Industry Linkages: Global Scenario

The experiences of university-industry linkage differ from continent to continent, country to country and university to university. The close relations between the university and industry make university curricula more meaningful by creating the chance for incorporating contextualized content (Wondwosen, 2014). This study has tried to see the university-industrial linkage experience of some African, Europe and Asia courtiers as follows.

According to Ssebuwufu, et al., (2012) university linkages with the industry sector in Africa is constrained by, inter alia: low number of qualified faculty, such as brain drain, aging of faculty, staff retention, inadequate research infrastructure, at many universities, funding constraints, and teaching rather than research–focused mandates. In contrast, Ssebuwufu, et al., further stated that HEIs in Africa are taking steps to link with the productive sector. However, they may have limited experience, expertise and resources to strongly enrich engagement with the productive sector and universities lack networks with industries. Abdu (2013) has presented the experience of some African countries (Ghana and Nigeria), Asian countries (China, Singapore & Japan), USA and Europe (Belgium and Germany) illustrates some of the remarkable contributions of UIPs.

No	Countries	Experience of University-industry linkage	Overall Trend of UIL
1	Africa (Ghana and Nigeria)	*Efforts in providing consultancy and establishment of research and development centers were being made.*	*Implementation of UIL is still weak and has not contributed that much to the Socio-economic development of nations due to various reasons.*
2	Asia (China, Singapore, Japan)	**China**: *Students' industrial attachment was highly emphasized and encouraged Highly successful in generating its internal income and getting research funds through the efforts made in technology transfer and provision of consultancy services for industries.* **Singapore:** *Made remarkable efforts in knowledge commercialization including technology licensing industrial sponsored research, consulting, and publishing.* **Japan:** *Working with industries is a very attractive option for universities to be better funded and better equipped with educational facilities*	Implementation of UIL is successful and fruitful.
3	Europe (German and Belgium)	**Belgium:** *Has established research and development center in collaboration with industries on contract research, consultancy, patents, spin-offs, and research parks.* **Germany:** *Adequate internship opportunities provided to students, some industries create employment and scholarship opportunities for outstanding students, provide some financial supports for the service students render during internship.*	There is advanced, successful and fruitful UIL
4	USA	*There is remarkable practices of technology transfer from universities*	

Table2.1. Experience of different countries in relation to university-industry linkage

2.6. Benefits of University- Industry Linkage

Synergies between university and industry could provide a number of advantages. This includes generating supplementary income, access to technology and equipment, consultancy, practical experience, training and curriculum development, community service and image building, and employment opportunities for students and so forth (Martin, 2000, Wondwosen, 2014, Ssebuwufu, et al. 2012). From these, income generation is considered as "the most driving force for the collaboration with industry" (Martin, 2000). In addition to this, Daniel (2008) suggested that the university-industry linkage benefits the two parties in different ways. The relationship can benefit the industries by:

> *solving technical and managerial problems, injecting new processes, technologies, maintaining and improving productivity and efficiency, facilitating further training of staff and students (Daniel, 2008).*

In similar vein, Daniel further stated that the university can be benefited through:

> *practical training of students, making R&D relevant while maintaining independence of staff, augmenting its R&D resources with those from UICP, obtaining feedback on the direction of R&D, curricula, teaching approaches and consultancy services (Daniel, 2008).*

Furthermore, Prigge (2005) has classified the benefits that may be gained by the universities from university-industry linkages in to three. They are:

a) **Economic benefits**. It includes financial support to enhance teaching- learning activities, reduction in the resource requirements of the university, returns on equity or investment from the growth of intellectual property, resource of adjunct faculty with real world experience Potential for future opportunities.
b) **Social benefits**. This contains application of knew knowledge to the practical need of the society, knowledge diffusion, open the frontiers of knowledge, accomplish mutual goals to benefit each other and society, encouragement of legislation to support higher education.
c) Other benefits include job placement for students, opportunity to recruit faculty and staff, chance to take advantage of spillovers from both research and teaching , increased

institutional prestige, overall infusion of enthusiasm for those involved with such collaborations.

2.7. University-Industry Linkage Experience of Ethiopia

Globally, the late nineties are considered as the relationship between the universities and industries reaches its peak point (Martin, 2000).However, in the case of Ethiopia, the formal university-industry linkage begins around the mid of 1980s by the co-operation program between Addis Ababa University and Ministry of Industry (Daniel, 2008), but due to the change of policy by the government, the university-industry relation declined and the program was suspended. Afterwards a number of policies, programs and strategies were introduced and forwarded to strengthen the university-industry partnerships.

As noted bay Abdu (2013) the issue of strengthen the provision of engineering education by giving due attention to students practical exposure to industries was the priority agenda of the government. For instance, the Education and Training Policy (ETP) (1994) relay on ‘’*the participation of students in higher education programs, in gaining the necessary field experience before graduation will be facilitated.’’* Besides**,** the Science, Technology and Innovation Policy (STI) (2012) pointed out that the level of qualified manpower capable of transferring foreign technology is low and inadequate to facilitate the effective transfer of technology. Hence, to solve the existing quality problem, it demands to change the knowledge-based system of education to competency-based type of curriculum so as to improve the skills, job-specific skills and transferable skills of graduates after completing the curriculum (MoE, 2018). In similar way, GTP II (2016) suggested that to produce qualified work force which meet the needs of the industry, the momentum to strengthen existing linkage of university with industries need to be continued.

2.7.1. The Practice of University-Industry Linkage

Planning is one of the functions of management. An organization may not carry out its activities effectively and efficiently without proactive planning. As an institution, therefore, universities are expected to include UIL activities in their strategic and operational plan. To address the

needs of the industries involving the industries during the preparation of the UIL plan is critical. However, as Tsegaye (2011) and Misganu (2018) identified that the involvement of industries in planning, implementation and evaluation of UIL were unsatisfactory. Similarly, "the existing level of university industry linkage in Ethiopia is yet at its rudimentary stage and leaves much to be desired" (Wondwosen, 2014).

Besides, Ranganthan and Abraham (2018) suggested that the status of the linkage between the industry and university was in an infant stage. This shows that the existence of linkage between the industries and universities below the required level. In contrary to these, Estifanos and Melaku (2018) noted that the linkage between the industry and university ranges from medium to higher level. Furthermore, Mulu (2017) identified that there was lack of robust to bring all actors (university, industry and government) on the platform to collaborate in university-industry linkage and this was resulted from lack of willingness on both the universities and industries to engage in meaningful collaboration.

Regarding curriculum development, skill assessment, staff exchange, and educational visit different studies have been done. For instance, Tsegaye (2011) remarked that the involvement of the people of industries in curriculum designing was below the level of expectation and there was also lack of awareness, commitment and communication in the participation of curriculum. This refers that the exact needs of the industries were not part of the universities program. Additionally, as Misganu (2018) reflected that the industries had low rate of involvement in curriculum development, and skill assessment. Conversely, Kannan (2012) evidenced that the existence of alliances between university and industry are not in full capacity. Moreover, there was a gap to recognize the benefits and hidden opportunities of the linkage. In general, the university-industry linkages in the Ethiopian context are still in infancy stage even though there have been efforts to strengthen them (STEP/MoE, 2018).

2.7.2. Mechanisms of University-Industry Linkage

There is a variety of mechanisms for university-industry linkage. Some of the methods, Schiller and Bramble (2009), are training centers, consultancy units, research laboratories, science parks and incubators and technology councils. In addition to these, internship programs for students,

contract & collaborative research work, enterprise support and development, technology transfer and commercialization of intellectual property can be mentioned (Wondwosen, 2017). Furthermore, Rast, Khabirici, Senin (2012) stated consultancy and technical service provision, cooperative R and D agreements, licensing, contract research and spin-off companies are some forms of university-industry linkage.

According to Esham (2008) university industry linkage consists of a wide range of areas such as seminars, workshops, trainings, contract researches, consultancy services, spin-offs and so on. Further to this, the researcher puts the development of interactions in the following graph.

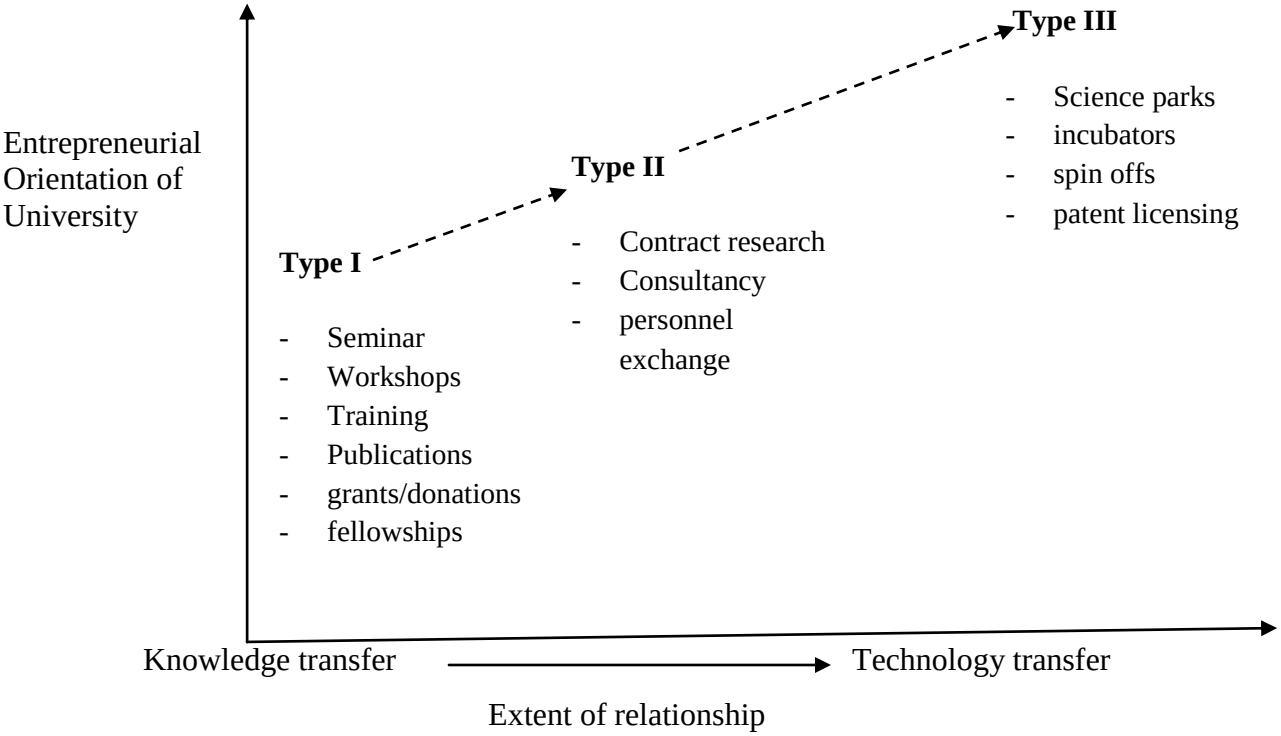


Figure 2.5: Typology of university-industry interactions (Source: Esham, 2008)

In Ethiopia, a study conducted by Estifanos and Melaku (2018), the most frequently implemented areas of UIL were students' internship and training. Likewise, Ayenew, et al. (2015) reported that students' internship and consultancy service were frequently used linkage areas. Similarly, internship, consultancy services, research and trainings are the main forms of interaction between universities and industries respectively (Ayenew and Teklay, 2017).Contrary to these, the linkage between the universities and industries is limited to students' internship only

(Kannan, 2012). From these it is possible to deduce internship program, consultancy service and training were the most practiced areas of linkage.

2.7.3. Factors or Challenges that Affect the University-Industry Linkage

A number of factors influence the linkage between the universities and industries. According to M.sa' (no date) cultural difference between higher education and industry (for instance; little awareness about one another, different goals and priorities), lack of trust and confidence in universities (mistrust towards the university as an institution), weak institutional capacity, in adequate leadership support and initiation, policy framework to enable successful linkages are among others. In similar vein, Mulu (2017) classified the factors into three broad categories as follows.

1) **University characteristics:** it includes the commitment and competency of leadership, allocation of adequate funding, presence of policies and better internal governance and motivation and willingness to engage in collaborative work and so on.
2) **Industry characteristics:** it refers to the willingness and readiness of the productive sector to work with universities.
3) **The legal and policy environment:** it encompasses policies, systems, proclamation, and Science, Technology and Innovation and so forth.

In addition to these, MoE (2018) noted that the quality problems that affect the linkage is the result of low potential of universities to solve problems of industries, poor research infrastructure, poor integration of teaching and research, and poor linkage of research findings to the community are some among from others. Moreover, the growing unemployment of graduates raises questions about the quality and relevance of the curricula which are considered mismatch for the current labor market demand especially in technology and engineering fields (The Reporter Magazine, 2020). In this context, as cited by Zinabu, Yalew and Mungamuru (2015) explained that the mismatch between graduates and labor market needs to be corrected. Surprisingly, the skills and knowledge acquired by graduate students at many African universities do not prepare them properly to meet the needs of industry (Ssebuwufu, et al., 2012).

Further to the above barriers, Hiwote (2014) indicate that the university-industry linkage is at the infant stage due to lack of leadership commitment and initiation, distrusting and in confidences by the industry owners on the university expertise, illiteracy of industry owners, lack of skilled workforce to innovate new technology, inadequate budget allocation, financial constraints and policy drawbacks, poor communication between the university and industry, and universities pay attention to the teaching load as compared to the outreach service. On top of this, Mulu (2017) identified that the poor capacity of the universities in producing commercially attractive research and innovation outputs, lack of readiness and willingness in both the universities and industries to engage in meaningful interface, inadequate institutional commitment and support were the major challenges to establish strong relationship.

Besides, Tsegaye (2011) find out the involvement of the industries in strategic plan development as well as implementation were below what was expected and the strategic plan doesn't align to the need of the industry. Likewise, lack of common understanding about curriculum, awareness, communication and commitment, strategy and guiding rules and procedures were impeding factors for loose linkage (Mulu, 2017). Moreover, STEP-GIZ, MoE (2018) identified five major barriers or challenges of UIL in Ethiopia namely: shortage of skilled man power, skills gap of industry employees, quality of industrial products, problem of production and service delivery and the need for state-of-the -art technology and enhanced industrial knowledge.

Furthermore, the reasons for week UIL in Ethiopia include limited cognizance of industry on the roles of research and capacity building to enhance productivity and quality of institutions, universities rarely attempting to provide update bureaucratic processes, companies undermining the benefits of patenting with universities, HEIs give insufficient attention enhancing the theoretical knowledge and skills of their staff and students using industry visit and practice, and instructors at universities have time and motive constraints to update the skills and knowledge because of overburden with teaching loads (STEP-GIZ, MoE, 2018). On the other hand, this document also categorized the barriers of university-industry linkages into three as cultural barriers, institutional barriers and operational barriers.

Besides, still there are other obstacles for example; academic research is often initiated for the sake of grant seeking whereas research in the industry usually has a profit- making motive (STEP/GIZ, MoE, 2018) and the government failed to take need assessment before establishing linkage between the universities and industries. In summary, there has been observed some conflicting values and common interests between universities and industries. The table below shows the conflicting values and common interests of universities and industries.

Table 2.2: Conflicting value verses common interests between universities and industries

Criteria	Universities	Industries
Mission	- teaching, - research, - service, - economic development	- profit, - product R and D
System	- academic freedom - open discourse	- confidentiality - limited public disclosure
Focus	- knowledge for knowledge's sake	- management of knowledge for profit
Common interest	- commercialization of new and useful technologies consultancy	- commercialization of new and useful technologies consultancy

(Modified source from: STEP-GIZ, MoE, 2018)

2.7.4. Efforts Made by the University Management and Government to Strengthen UIL

The coordination among the three actors has an important role to produce skilled manpower that can contribute for the sustainable development. As noted by OECD (2013), in triple helix model the three actors constitute interdependent and relatively equal spheres. The university's role is to produce qualified graduates to work at the industries whereas the industries need skilled manpower to run their business. The government has its own responsibility to create conducive environment for the linkage between the university and industry.

2.8. Conceptual Framework of the Study

The conceptual framework of this study was developed based on the theories and empirical studies presented so far. The framework is, therefore, designed and organized depending on human capital theory, triple helix model, resource dependence and knowledge production. It was basically framed on the bases of input, process and output. To keep the university-industry-government relationship harmoniously, their linkage should be networked to result the intended mutual benefit.

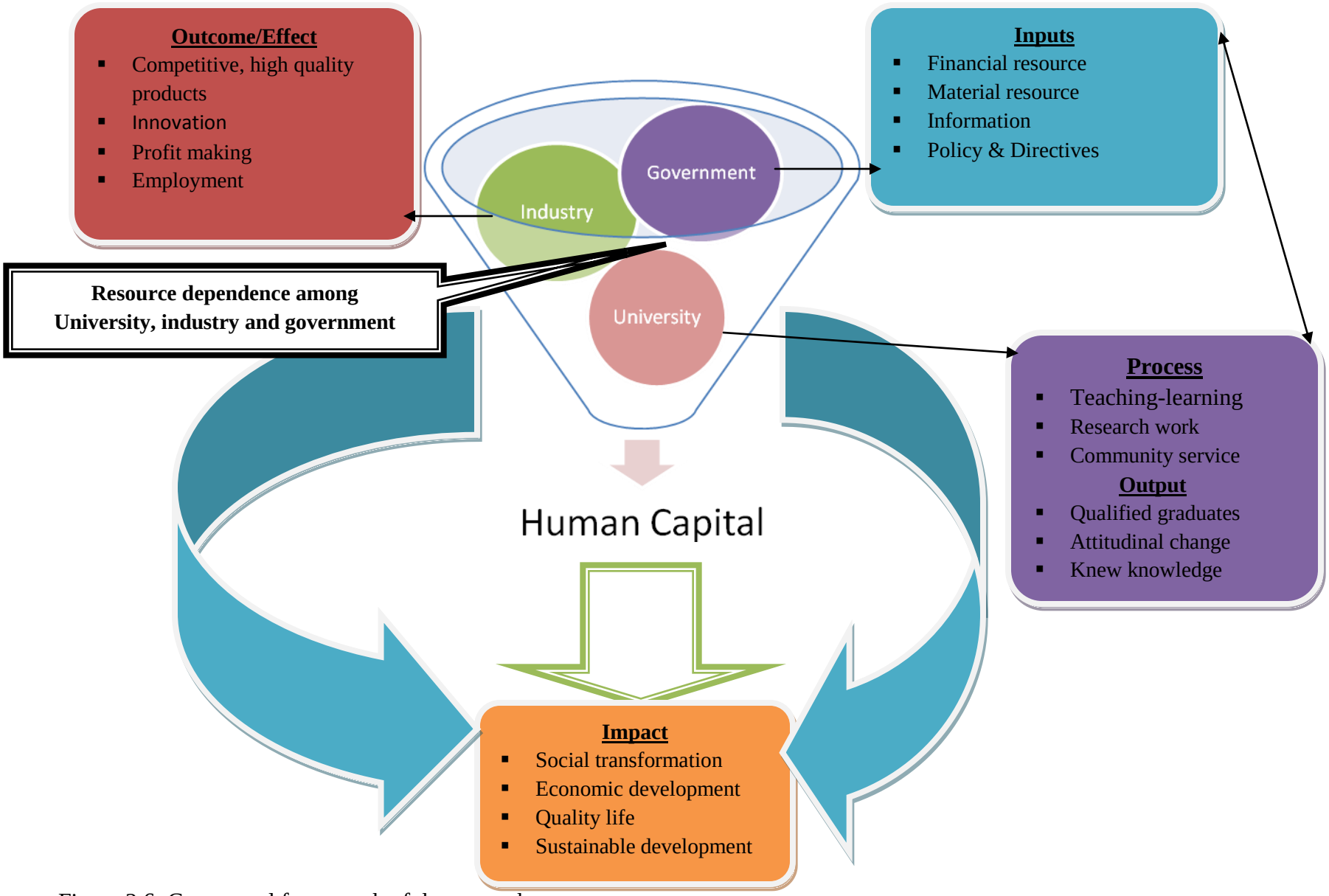


Figure 2.6: Conceptual framework of the research

2.9. Summary

The previous chapter deals with presenting review of the related literature concerning the university-industry linkage. A number of literatures were reviewed to identify what had been done so far and what limitations were observed in relation to the practices and challenges of university-industry linkage. In addition to these, a variety of theories were also reviewed to consolidate the actual experiences with the theoretical aspects related to the research topic. Accordingly, human capital theory, triple helix model, production of knowledge, resource dependency theory, concepts and characteristics of industrial park, global and local experiences of university-industry linkage, benefits of university-industry linkage, conceptual frame work of the study were discussed in detail. The major issues that were raised are condensed and presented as follows.

1. **Human capital theory and the roles of universities for formation of human capital**

It encompasses the skills, competencies and other attributes embodied in individual that affect the human capabilities which that enhance personal, social and economic development. Moreover, human capital is the stokes of productive skills, talents, health and expertise of the labor force, just as physical capital is the stock of plant, equipment, machines and tools.

Universities hold three mandates namely teaching-learning, research and community services. The ultimate goals of these mandates are to produce qualified human capital. In this regard, they are places where formal non-formal forms of education take place for the formation and development of human resources. They play critical role for generation, accumulation, transfer and use of knowledge, skills and attitudes.

2. **Triple helix model and production of knowledge**

Triple helix is the spiral model of knowledge production that encompasses multi reciprocal interfaces to enhance the socio-economic development. It is cooperation among university, industry and government bodies for mutual benefit and survival. The university is responsible for producing qualified graduates, valuable research out puts and delivering community services. On

the other hand, the industry sectors provide quality products, employment opportunity, and practical exposure to the students and researchers as well. Moreover, the government is there to create conducive working environment by formulating policies, procedures and implementing them effectively. Therefore, all the three actors must work cooperatively to survive and function since one is the complementary of the other.

3. Resource Dependency Theory (RDT)

As stated above, the three actors should work together to complement one another. No one organization stands alone unless they share resources. The unequal distribution of resources obliged organizations to exchange materials, knowledge, skills and attitudes. There is an inter-dependence and connection between organizations to survive and function sustainably.

4. Concepts and Characteristics of Industrial park

The term industrial park indicates a tract of land developed and sub-divided into plots according to a comprehensive plan with the provision of roads, transportation and public utilities with also common facilities for use by a group of manufacturers. It consists of a broad range of concepts, like free-trade zones, export processing zones, special economic zones, high-tech zones, free ports, enterprise zones. The major characteristics of industrial parks are geographically-delineated tract of land, detailed master planning and single management entity.

5. Global and Local Experiences of University-Industry Linkage

Empirical studies show that countries of the world have different experience in the formation of university-industry linkage. The well developed, developed and developing countries have advanced, intermediate and low university-industry linkages experiences respectively.

6. Benefits and Mechanisms of University-Industry Linkage

Different research works suggested that linkage between university and industry results a number of benefits mainly economic, social and other related benefits. Some of the mechanisms of UIL are seminars, workshops, training, consultancy, contract research, and patent licensing.

7. University-Industry Linkage Experience of Ethiopia

In Ethiopia, the formal university-industry linkage begins around the mid of 1980s by the cooperation program between Addis Ababa University and Ministry of Industry. However, different research findings identified that the intended university-industry linkage was not satisfactory due to various reasons. The existing university-industry linkage in Ethiopia is yet at its rudimentary stage and leaves much to be desired and it is found at its infant stage. The involvement of industries in curriculum development, skill assessment, planning and implementing did not meet what had been planned.

CHAPER THREE

RESEARCH DESIGN AND METHODOLOGY

The purpose of this study was to examine the practices and challenges of the university-industrial park linkage of some selected universities in Addis Ababa. The study adopted the pragmatism research paradigm that underpins mixed research approach. The philosophical assumption of this study encompasses the nature of social reality (ontology) and how researchers know what they know (epistemology) (Gay, Mills and Airasian, 2012) & Miller and Brewer, 2003). In order to achieve the objective, an appropriate research approach, methods, sample and sampling techniques, data gathering tools, methods of data analysis, presentation and interpretation were implemented that are compatible with the identified problem.

3.1. Research Approach

This study employed sequential mixed methods designs. In mixed research the combination of quantitative and qualitative approaches offers better understanding of the research problem than either quantitative or qualitative approach alone (Creswell, 2014). Even though many scholars have been debating on quantitative verses qualitative approach, mixed method enables to offset the weaknesses that exists in both quantitative and qualitative research methods (Gay, et al., 2012). Moreover, neither quantitative nor qualitative research design is better than the other; both of them are different and have their own strengths and limitations (Dawson, 2007). Hence "the findings of the quantitative study determine the type of data collected in the qualitative study" (Gay, et al., 2012). Accordingly, the quantitative data were gathered before qualitative collection. Then, the qualitative data collection emphasized to obtain missed information from quantitative approach so as to offset the limitations of quantitative data.

3.2. Research Method

This study employed descriptive survey research approach. Descriptive research is helpful to show the current practices and the magnitude of the problem exists in relation to the issue as it is. In addition to this, descriptive survey research is also useful to collect empirical data from large

population by selecting representative samples and it helps to dig out reliable data so as to reach sound generalization. Moreover, it can be used to gather information about a group's beliefs, attitudes, behaviors, and demographic composition (Gay, et al. 2012).

3.3. Sources of Data

This study used primary and secondary data sources to obtain reliable and valid information about the existing practice and challenges of the university-industrial park linkage in some selected public universities in Addis Ababa.

3.3.1. Primary Sources: University-industry linkage directorate, school/college deans, department heads, coordinators, instructors, experts' speech and industrial park representatives were used as a primary source to obtain first-hand information about the university-industrial park linkage practices and challenges.

3.3.2. Secondary Sources: to triangulate the primary sources, different government document such higher education and industrial park proclamations, university-industry linkage manuals, annual abstracts, reports and proceedings were used as a secondary data sources.

3.4. Population, Sample Size, and Sampling Techniques

3.4.1. Population

As it was explained in the study area, the sites of this study were AAiT and AASTU. AAiT has six schools and similarly, AASTU has four colleges which offer in engineering and applied science. The details of the population of the study are presented in the table below.

Table 3.1: Population of the Study

University/ Institute	Number of Academic Staff		
	M	F	T
AAiT	295	50	345
AASTU	360	45	405

Note: School of Chemical and Bio, Electrical and Computer, Civil and Environmental, Mechanical and Industrial were the population of the study for AAiT where as for AASTU College Architecture and Civil Engineering, Applies science, Biological and Chemical, and Mechanical and Electrical Engineering were the population of the study.

Additionally, one representative from IPDC and another one representative from Bole Lemi Industrial Park were taken as population for this study.

3.4.2. Sample Size and Techniques

The purpose of this study was to investigate the practice and challenges of university-industrial Park in some selected public universities in Addis Ababa. To meet this aim, the site of this study focuses on governmental universities nearer to the industrial parks. At the time of this study, there were about three public universities in Addis Ababa. The industrial parks found in Addis Ababa were two Bole Lemi and Kilinto industrial park. However, at the time of this study Kilinto industrial park was not fully functional. The four universities (Addis Ababa University, Addis Ababa Science & Technology University, and Kotebe Metropolitan University now Kotebe Education University) were being taken as a population for this study.

Table 3.2: Population and Sample of the study

University/ Organization/ Industrial Park	Informants /Respondents	Population Size	Sample Size	Sampling Method
AAiT	UIL-Directorate	1	1	Purposive sampling
	School deans	6	4	Purposive sampling
	Chairs	30	22	Purposive sampling
	Instructors	308	30	Simple random sampling
	Total	**345**	**57**	
AASTU	UIL-Directorate	1	1	Purposive sampling
	College deans	5	4	Purposive sampling
	Department heads	26	18	Purposive sampling
	Instructors	373	32	Simple random sampling
	Total	**405**	**55**	
IPDC	Representative	1	1	Purposive sampling
Industry park	Representative	1	1	Purposive sampling
	Grand total	**752**	**114**	

Depending on the sample size, Addis Ababa Institute of Technology and Addis Ababa Science & Technology University were selected using purposive sampling. Because the programs delivered by the two universities were directly related to the topic of this study and it was assumed that relevant information could be obtained for this research.

Therefore, the university-industrial linkage directorates, college/school deans, department heads, program chairs and instructors were assumed the right respondents of the study. To this effect, those who hold from chair and above positions were selected using purposive samplings. The instructors were also selected using simple random sampling. Simple random sampling offers equal chance for the respondents (Yalew Endawoke, 2009).

In addition to this, one representative from the industrial park and another respondent from the Industrial Park Development Corporation were taken as informants of the study using purposive sampling. Regarding the sample size, Gay, et al., (2012) advised that for survey research it is common to sample 10% to 20% of the population; however, the larger the population size, the smaller the percentage of the population required to get a representative sample. It is also recommended to take 12% for nearly 900 total populations. The total population of this study was nearly 752. Out of this, 15.2% of the total population i.e. 114 was taken as sample size of this study using proportional sampling both in size and academic rank. From this, 110 of them were respondents for the questionnaires and the remaining 4 informants for the interview.

3.5. Data Gathering Tools

Data collection instruments such as questionnaires (for school or college deans, Chairs, department heads and instructors) and semi-structured interview (for UIL directors, IPDC and Industrial Park) were used to collect data. Applying various data gathering tools is important as well as helpful to strengthen the weakness of each tool and to triangulate the data. For this study, questionnaire was used as the major data gathering tools. In addition to this, interview was used to enhance and enrich the data collected through questionnaires.

3.5.1. Questionnaires

A questionnaire is a written collection of self-report questions to be answered by a selected group of research participant (Gay, et al., 2012). It allows the researcher to collect large amount of data in a relatively short amount of time. Questionnaires are helpful to collect wider first-hand information from many respondents at a time. Additionally, questionnaires can be helpful to offset the weakness arise from using either quantitative or qualitative data collection ways. The researcher of this study had constructed a set of questionnaires which contain closed ended and open ended questionnaires were prepared and distributed for deans, department heads, coordinators and instructors. The respondents of this study were well educated. Therefore, the questionnaires were prepared in English.

For this study, questionnaires are assumed as the major data collection tools. As a result 110 copies questionnaires were distributed to respondents. Out of these, 95 (86.36%) questionnaires were returned. The rest 12 (13.63%) questionnaires were not returned. The remaining 3 questionnaires found incomplete and were rejected.

3.5.2. Interview

Interview plays a critical role to explore a certain phenomenon in depth and breadth and is also useful to offset the limitation of information collected through questionnaires. Hence, semi-structured interview questions were employed to gather information from university-industry linkage directorates, senior instructor, representatives of industrial parks and Industrial Park Development Corporation. Semi-structured questions are more flexible so that it provides an opportunity to get detailed information about the subject matter. In addition to this, semi-structured interviews provide sufficient freedom for respondents to develop their answers in their own terms, life experience and at their own length and depth (Miller and Brewer, 2003). In conclusion, four interviews (with two UIL-Directors, one IPDC and also another one Industrial Park's representatives) were conducted. All the interviews conducted with the UIL-Directors, IPDC and Industrial Park representatives took seven hours.

3.6. Procedures of Data Collection

In this study, data collection process passed through three main steps. Prior to the full-scale study, questionnaires were distributed to few respondents for pilot test. Pilot test plays an important role to identify unanticipated problems or issues and to improve vague instructions, wrong question items and other errors exactly as planned (Gay, et al., 2012). Secondly, the actual dissemination and collection of questionnaires were carried out. Thirdly, after the quantitative data collected and analyzed the qualitative data were gathered and interpreted. The qualitative data analysis and interpretation helps to explain or elaborate on the quantitative results (Gay, et al., 2012).

3.7. Methods of Data Analysis

As it was explained in the research approach, mixed research methods were applied. Thus, the study employed both quantitative and qualitative data analysis methods. Accordingly, the quantitative data obtained through closed-ended questionnaires were analyzed using descriptive statistics such as mean and percentage. Besides the study applied independent sample t-test using SPSS version 24 (at alpha = 0.05). "Independent sample t-test a parametric test of significance used to determine whether scores from two groups are significantly different at a selected probability level" (Gay, et al., 2012), it is efficient and helps to keep the error rate under control. In this regard, the mean is an average result that helps to measure the central tendency of scores (Gay, et al., 2012).

Descriptive statistics are useful to simplify bulk data so that it helps to handle the data collected from the field easily. Following this, inferential statics were be used to summarize and give meanings for data obtained by the descriptive statistics. On the other hand, the qualitative data obtained by interview (Amharic ones) were analyzed through transcribing or translating from Amharic to English language. The interview conducted in English language was taken as it is. Additionally, the open-ended questionnaires were analyzed using descriptive or narrative analytic approach so as to enrich and triangulate the quantitative data obtained through questionnaires.

Task-based analysis is useful to sort out and present the data in line with the intended specific objectives of the study. Inferential statistics helps to draw conclusion depending on the results captured from the descriptive statistics. In relation to measurement, this study used nominal, ordinal, and interval scale of measurement when applicable.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

This chapter deals with presenting, analyzing and discussing data collected from respondents to find solutions for the basic research questions stated in chapter one of this study. Thus a set of survey questionnaires were distributed for deans, department heads, chairs, coordinators and instructors. Similarly, interviews were employed for university-industry linkage (ULI) directors, industrial park representative, instructors who had the exposure on UIL, and Industrial Park Development corporation representative. Accordingly, 110 copies of questionnaires were distributed to the respondents. Out of this, 86.36% (95) of questionnaires were properly filled, returned and analyzed. The rest 12 and 3 questionnaires were not returned and have been found incomplete to obtain the necessary information and discarded.

The analysis carried out combining the quantitative and qualitative data obtained both from the responses from questionnaires and interviews. As a result, the biography of respondents, the practices of university-industrial park linkage, areas or kinds of linkage, and the challenge that affect the linkage between the two entities was presented. The quantitative data interpretation was done based on interval scale than single point on a line (Creswell, 2012). For simplicity purpose, the actual mean ≤ 2.49 was taken as low or disagree or unsatisfied, the mean value between 2.50 to 3.49 were considered as average and the mean value ≥ 3.50 was taken as high.

4.1. Background/Biography of Respondents

Table 4.1: Frequency and percentage distribution of respondents' characteristics

No	Characteristics of respondents		Respondents	
			%	No
1	Sex	Male	88.4	(84)
		Female	11.6	(11)
2	Educational qualification	MA/MSc	54.7	(52)
		PhD	45.3	(43)
3	Academic rank	Lecturer	55.8	(53)
		Assistant professor	26.3	(25)
		Associate professor	14.7	(14)
		Professor	3.2	(3)
4	Current position at the university	School/college dean	8.4	(8)
		Department head	15.8	(15)
		Chairs	23.2	(22)
		Instructor	52.6	(50)
5	Service year at the university	1-5	10.5	(10)
		6-10	64.2	(61)
		11-15	23.2	(22)
		36-40	2.1	(2)

Table 4.2. Background of Informants (UIL-Directors, Industrial Park & IPDC Representatives)

No	Characteristics of informants		Informants	
			%	**No**
1	Sex	Male	100%	(4)
2	Educational qualification	BA	50	(2)
		PhD	50	(2)
3	Academic rank	No academic rank	50	(2)
		Assistant professor	50	(2)
4	Current position at the university / organization	UIL- Directors	50	(2)
		IPDC representative	25	(25)
		Industry park representative	25	(25)
5	Service year at the university/organization	1-5	50	(2)
		6-10	50	(2)

Table 4.2 and 4.3 depict the biography of the respondents. It is evidenced that the majority of respondents were male. It accounts 89.9% of the total respondents and informants. It indicates that the number of female academic staff in the universities were limited and less involved in managerial positions at the universities. Vis-à-vis educational qualifications, most of the respondents were second degree holders. However, the number of PhD holders was also significant. Similarly, the table revealed that the academic rank of the respondents ranges from lecturer to professor level. However, as shown in the above table, as the level of academic rank increases, the number of academic staff in the universities decreases. Most of the respondents or informants had 6 to 10 years of service in the university or organization they were working. This indicates that majority of the respondents were well experienced and they had the exposure to provide sufficient information on the issue raised. On the contrary, the number of respondents above 15 years of experience was almost none. This shows that the number of senior academic staffs in the universities were very limited.

4.2. The Extent to Which the University-Industrial Park Linkage Exist

One of the main objectives of this study was to assess the practices of university-industrial park linkage. As shown in table 4.3, item 1 illustrates that most of the respondents reported that the universities did not involve the industrial park representative in UIL plan preparation. On the contrary, almost one third of the respondents were not sure whether the universities involve or not the industrial park representatives in the preparation of UIL plan. In sum, the mean value (M=2.75) shows that the participation of the industrial parks in the UIL plan preparation was unsatisfactory which is below the ideal mean (3.00).Likewise, majority of the respondents responded that the implementation level of UIL plan was low. In the meantime, almost on third of the respondents were uncertain to indicate the status of the implementation of the plan. However, the mean (M=2.66) value lie below the ideal mean (M=3.00). This implies that the level of implementing the UIL plan was below the required level.

In the same table, item 3 revealed that many of respondents replied that evaluating the effectiveness of the UIL plan was poor. On the other hand, one third of the respondents reported as they did not have information about the evaluation of the effectiveness of the UIL plan and the

actual mean (M=2.56) also proves this. In general, it is possible to deduce that the evaluation of the effectiveness of the UIL plan fall short of expectation. The finding of this study concerning the activities of planning, implementation and evaluation is consistence with findings of Tsegaye (2011) and Misganu (2018).

Table 4.4: The extent to which the university-industrial park linkage exist

Items	Very high 5	High 4	Average 3	Low 2	Very low 1	mean
1. Involve industrial park representative in UIL plan preparation	8.4(8)	17.9%(17)	33.7%(32)	20%(19)	20%(19)	2.75
2. Implement the UIL plan effectively	5.3%(5)	15.8%(15)	32.3%(31)	32.3%(31)	13.7%(13)	2.66
3. Evaluate the effectiveness of the UIL plan	4.2%(4)	9.5%(9)	37.9%(36)	34.7%(33)	13.7%(13)	2.56
4. Involve industrial park representatives in curriculum development	7.4%(7)	13.7%(13)	25.3%(24)	40%(38)	13.7%(13)	2.61
5. Allocate sufficient seed fund for the UIL	5.3%(5)	21.1%(20)	20%(19)	26.3(25)	27.4%(26)	2.51

To produce the required manpower and meet the needs of the labor market, it is expected to involve stakeholders in curriculum development. In this regard, the majority of respondents reported that the universities did not involve as expected the industrial parks in curriculum designing. The mean value (M=2.61) lower than the actual mean (M=3.00) which also implies the participation of industrial park in designing curriculum were not reached the expected status. As shown in table 4.4, item 5 as the respondents illustrated the universities were not allocated sufficient seed funds for the UIL activities. This proves that the allocation of budget for the university-industry linkage was insufficient to run the planned activities. The findings in relation to involving in curriculum development and budget allocation are harmonious with Misganu (2018) and Tsegaye (2011).

Planning by itself is not an end but it is a means to an end. Hence, implementing the UIL plan effectively plays an indispensible role for enhanced linkage. To attempt the level of implementation of the plan, like the planning stage, a five point rating scales of measurement were used. The table below presents the status of implementation of the UIL plan.

Table 4.5: The extent to which the University-industrial park linkage exist (continued from table 4.4)

No	Items	Very high	High	Average	Low	Very low	Mean
		5	4	3	2	1	
6	Assess the skills of graduates & the needs of industrial parks	8.4% (8)	18.9% (18)	37.9% (36)	21.1% (20)	13.7% (13)	2.87
7	Establish strong linkage with the industrial park	6.3% (6)	14.7% (14)	30.5% (29)	36.8% (35)	11.6% (11)	2.67
8	Encourage staff exchange between the university & the industrial park	6.3% (6)	26.3% (25)	12.6% (12)	33.7% (32)	21.1% (20)	2.63
8	Create direct graduate employment opportunities in industrial parks	3.2% (3)	26.3% (25)	28.4% (27)	28.4% (27)	13.7% (13)	2.77
10	Mobilize the industrial park to sponsor the university research works	5.3% (5)	8.4% (8)	21.1% (20)	41.1% (39)	24.2% (23)	2.29
11	Organize educational visit to industrial park	7.4% (7)	44.2% (42)	14.7% (14)	20% (19)	13.7% (13)	3.12
12	Aware the main activities of the university to the industrial park	7.4% (7)	23.2% (22)	25.3% (24)	33.7% (32)	10.5% (10)	2.83

As betoken in the table 4.5, item 6, the assessment of the skills of graduates and the needs of industrial parks made by the universities was unsatisfactory. On the contrary, one third of the respondents were average on the efforts made by the universities to assess skills of graduates and

the needs of industries. However, as compared to the other items presented in the table, it seems that the universities put better efforts to assess the skills of graduates and the demands of industrial parks. In conclusion, even if there was a progress in assessing the graduates' skill and industrial parks' need, however, were not complied the expectation.

Similarly, abundant of the respondents reflected that the linkages between the universities and the industrial parks very low. On the other hand, 30.5% of the participants of the study answered as the linkage between the two entities were average. The mean value (M=2.67) also lie below the ideal mean (M=3.00). This suggested that the linkage between the two entities was at infant stage. In this case, the status of university-industrial park linkage is analogous to the findings of Wondwosen (2017) and Ranganthan and Abraham (2018).

Moreover, as indicated in table 4.5, item 8, exhibit most, most of the respondents reflected as the support of the universities to encourage academic staff exchange between the universities and the industrial parks below the required level. From this, one can deduce that exchange rate of staff between the two entities were very limited. Furthermore, direct graduate employment opportunities created for graduates in the industrial parks were minimal. 42.1% of repliers responded that the efforts made by the universities to find ways for graduates to be employed in the established industry parks were low and very low.

In general, the data intimate that the negotiation capability of the universities to create job opportunity in industrial parks was poor. This may be resulted from the weak linkage with the industrial parks. A similar response can be observed concerning initiating the industrial parks (IP) to sponsor research works. As a result, majority of the respondents responded that the attempt of the higher education in mobilizing the IP to sponsor research works was low. The mean (M=2.29) value implies the existence of lower effort to win the willingness of IP. This infers that the strategic approach of the universities to get sponsorship from IP for research works were poor.

In contrast to the other items, item 11 revealed majority of the respondents answered that the universities had high performance in conducting educational visit to industrial parks. The actual mean value (M=3.12) lie above the ideal mean (M=3.00) confirms the existence of educational

visit. The findings of the study suggested that the universities had organized educational visit to share observe the activities of the industrial parks. Similarly, item 12 revealed that the majority of respondents replied as the awareness created by the universities was not enough. However, the response with the mean (M=2.83) show the universities effort to aware the activities of the universities to the IP. In sum, even if there was limitation in this regard, there was also an effort to aware the major activities of the universities to the industrial park.

As displayed in the table above, table 4.5, there is no significant difference between the two universities in terms of involvement in plan preparation, implementation and evaluation. Likewise, no significance differences were observed between the universities in terms of graduate skill assessment, need assessment of industrial parks, involvement in curriculum designing, linkage establishment, budget allocation, staff exchange, job opportunity, sponsoring research works, and educational visit to the industrial parks.

However, responses obtained from open ended questions indicated that there was slight difference between the two universities in terms of implementing UIL plan, allocating budget for UIL, assessing the skills of graduates and needs of industrial parks, joint curriculum designing, establishing linkage, graduate employment opportunity, research sponsoring, and introducing main activities of the university. As the responses gained from the open-ended , Addis Ababa Institute of Technology exhibit better accomplishment in terms of implementing UIL plan, allocating budget for UIL, assessing the skills of graduates and needs of industrial parks, joint curriculum designing, establishing linkage, graduate employment opportunity than Addis Ababa Science and Technology University Nevertheless, Addis Ababa Science and Technology University had better achievements in terms of joint plan preparation, staff exchange, and educational visit. These indicate that there was no significant difference in accomplishing the variables described above. However, Addis Ababa University had a little better achievement in most indicators of the practices of UIL.

Additionally, regarding the practices of linkage between the universities and industrial parks, an open ended question was raised besides the practices listed in the table above. Most respondents replied that there was no linkage practices beyond the activities listed in the table. Still, a

respondent reported that a project was done between AAiT and Bole Lemi Industrial park on sustainable resource management. Most of the respondents reported that there was no effective linkage with industrial parks.

In addition to the questionnaire, interviews were conducted to understand the extent to which the linkage between the universities and industrial parks exist. Concerning this, a respondent from the UIL director office responded that.

> *The university is approaching several industrial parks such as Bole Lemi, Kilinto and Hawassa industrial parks to work together with them. But unfortunately there is no active engagement and no assigned particular focal person to facilitate the collaboration from the industrial parks side. There is no positive response from the industrial parks side to the university's request (Informant 1, June 1, 2021)*

In addition to this, a respondent from the industrial park side to the same interview question replied that:

> *The industrial parks are established to meet three pillars namely: foreign export, job creation, and technology transfer. However, there is no effective and sustainable linkage between the two entities to transfer the technology. This is because no contractual agreement has been made to collaborate with the universities except shade and export agreement. The linkage is limited mainly on students' internship program (Informant 2, June 7, 2021)*

Moreover, a senior university instructor who had an exposure in different proceedings reported that the university-industrial park linkage is unsatisfactory. According to the informant:

> *"There are three levels of linkage. Establishment of relationship; platform, formation of better linkage and achieving mutual benefits are the first, second and third levels of linkage respectively. Nevertheless, I don't believe that the platform does not exist. No satisfactory linkage is established and no mutual benefit gained (Informant 2, June 9, 2021).*

The information gathered using the interviews indicates that the extent to which the linkage between the universities and industrial parks did not reached even the minimal stage of development. There was no practical linkage and the industrial parks were not willing to give positive responses as such except some form of linkages.

4.3. Benefits Gained from the University-Industrial Park

To identify the benefits obtained from the side of the universities and the industrial parks, information were collected using open ended questions. Accordingly, from the universities side some practical experience, internship opportunity for students, and seed fund were obtained. On the other hand, from the industrial parks side promotion of products and services and consultancy service were the benefits gained from the linkages.

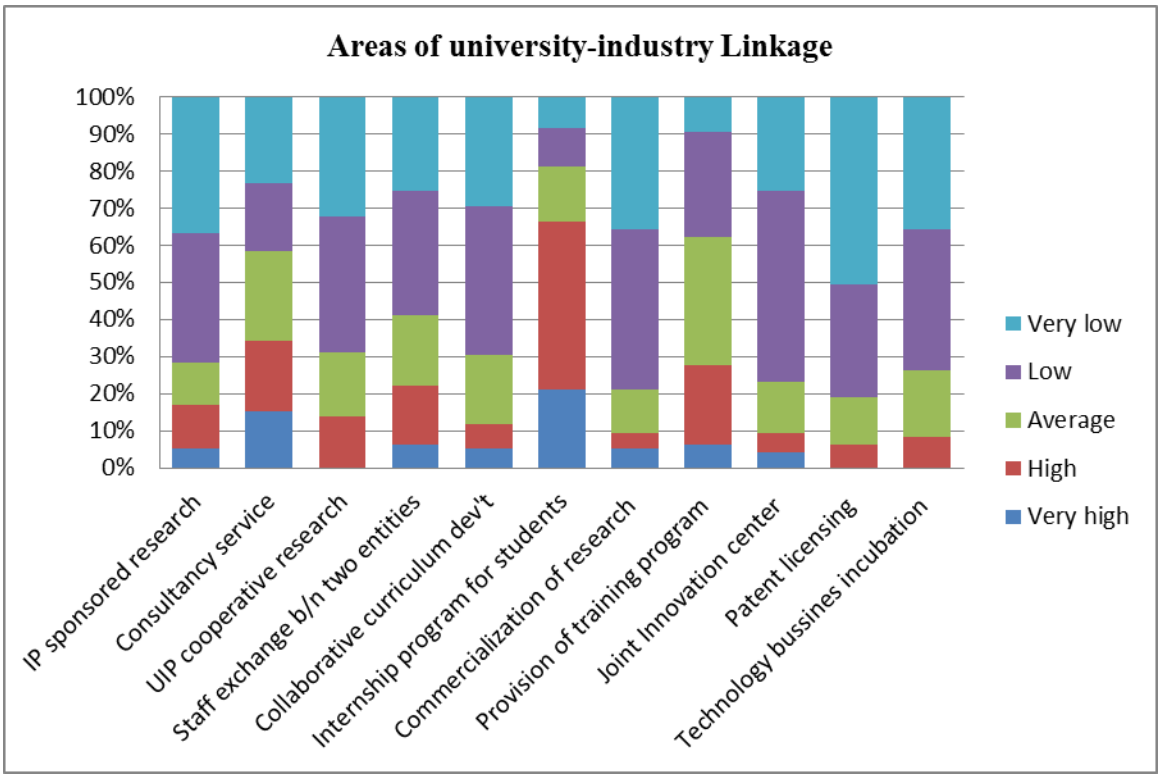
In addition to the open ended questions, some information about the benefits gained from the linkage was collected using interviews. As the source told to the researcher, the university has got internship access for students and practical problem solving opportunity. Conversely, the industrial parks benefited from short-term and long-term trainings, and technical services provided by the university. In short, the major benefits secured from the university-industrial park were internship program, consultancy service, and training.

4.4. Areas of University-Industrial Park Linkage

The respondents of this study were requested to provide their level of agreement in some areas of linkage. The bar graph presented below shows the extent to which the areas of the university-industry linkages were raked as follows.

1st - Internship program for students
2nd - Consultancy service
3rd - Provision of training program
4th - Staff exchange between the two entities (university and industry)
5th - IP sponsor research
6th - Collaborative curriculum development
7th - UIL cooperative research
8th - Commercialization of research output
9th - Joint innovation center
10th - Technology business incubation
11th - Patent licensing

Figure 4.1: Areas of University-Industrial Park Linkage



As shown in graph 4.1, internship program and consultancy service were the most implemented areas of linkage. On the other hand, provision of training and staff exchange were implemented next to consultancy service and internship programs between the two entities. However, IP sponsored research work, UIP cooperative research, collaborative curriculum development, and commercialization of research output, joint innovation center, and patent licensing fall short of expectation. In relation to the mechanisms of linkage, Estifanos and Melaku (2018) identified that students' internship and training as the most implemented area of linkage whereas Ayenew, et al. (2015) put internship and consultancy service were better performed linkage mechanisms. However, Kannan (2012) noted that the linkage between the industries and universities were limited to internship programs. Thus the finding of this study is similar to Ayenew, et al. (2015) and partially consistent with Kannan (2012) and Estifanos and Melaku (2018).

An open ended question was raised regarding the most frequent used areas of linkage in the universities. Accordingly, majority of the respondents indicated that constancy, internship

program and training were exercised effectively between the universities and the industrial parks. This confirms that the data obtained through quantitative means had the same result with the qualitative method. In short, no difference had observed between the data gathered via qualitative and quantitative approaches.

4.5. Challenges that Impede the University-Industrial Park Linkage

A number of challenges may hinder the linkage between universities and industrial parks. This study, therefore, tried to investigate the factors that affect the linkage of the two entities. The following table shows the factors that affect the UIPL.

Table 4.6a: Challenges that impede the university-industrial park linkage

No	Items	Very High (5)	High (4)	Average (3)	Low (2)	Very low (1)	Mean
1	Lack of willingness of the industrial park	31(32.5%)	27(28.4%)	28(29.5%)	3(3.2%)	6(6.3%)	3.78
2	Lack of trust and confidence on university's capacity	20(21.1%)	50(52.6%)	17(17.9%)	8(8.4%)	-	3.86
3	Inadequate leadership support and initiation	29(30.5%)	42(44.2%)	17(17.9%)	3(3.2%)	4(4.2%)	3.94
4	Poor communication between the university & industrial park	33(34.7%)	37(38.9%)	14(114.9%)	6(6.3%)	5(5.3%)	3.92
5	Cultural difference between the university & industrial park	33(34.7%)	37(38.9%)	14(114.9%)	6(6.3%)	5(5.3%)	3.34
6	Illiteracy of industry owners	6(6.3%)	11(11.6%)	37(38.9%)	28(29.5%)	13(13.7%)	2.67
7	Irrelevance of programs to the labor market	23(24.2%)	21(22.1%)	31(32.6%)	17(17.9%)	3(3.2%)	3.46

8	Inadequate budget allocation for linkage	33(34.7%)	33(34.7%)	25(26.3%)	2(2.1%)	2(2.1%)	3.98
9	Absence of guidelines/policies at the national level	23(24.2%)	28(29.5%)	21(22.1%)	16(16.8%)	7(7.4%)	3.46
10	Existence of difference in goal and priorities	2(2.1%)	35(36.8%)	36(37.9%)	13(13.7%)	9(9.5%)	3.08
11	Over teaching loads/workload	37(38.9%)	23(24.2%)	21(22.1%)	12(12.6%)	2(2.1%)	3.85
12	Poor research infrastructure	24(25.3%)	29(30.5%)	21(22.1%)	15(15.8%)	6(6.3%)	3.53
13	Mismatch between the skills and the need of the labor market	13(13.7%)	30(31.6%)	28(29.5%)	15(15.8%)	9(9.5%)	3.24
14	Industries give much emphasis on profit maximization	30(31.6%)	26(27.4%)	17(17.9%)	19(20%)	3(3.2%)	3.64

As shown in table 4.6, the key factors that affect the UIPL could be presented orderly as follows:

1) Inadequate leadership support and initiation
2) Lack of trust and confidence on university's capacity
3) Poor communication between the university & industrial park
4) Cultural difference between the university & industrial park
5) Over teaching loads/workload
6) Absence of guidelines/policies at the national level
7) Lack of willingness of the industrial park
8) Poor research infrastructure

In general, the factors such as program and skill mismatch inadequacy of budget, existence of goal and priority difference, over teaching load, and poor infrastructure were some factors for the unsatisfactory linkage. The results found in the above table are against with Zinabu, Yalew and Mungamuru (2015) conversely it coherent and non-conflicting with the findings of Hiwote

(2014) and Mulu (2017). The mismatch between the skills of graduate and the needs of industrial parks do not exist as intended. It is also consistent with OECD (2001) findings that the misalignment of demand and supply of human capital can be manifested by under and over qualification.

In the quantitative analysis of data, it was indicated that a variety of factors hindered the interface between the industrial parks and universities in different ways. To consolidate the quantitative data, information were collected through open ended question items and interviews. Thus to identify the factors that affect the university-industrial park linkage open ended questions were provided to the respondents. The respondents reported that the main internal challenge were lack of leadership commitment and attention, poor research facilities, inadequate budget, presence of teaching loads, poor communication, absence of proper structure for the linkage, skill and knowledge gap, too much attention has been given to the theoretical aspect of lessons, absence of strategic approach and absence of conducive environment for the linkage.

On the other hand, the external factors stated by the respondents were lack of willingness and interest from the industrial park, lack trust and confidence on local universities capacity, absence of guidelines to establish linkage, absence of clear goals and objectives at the national level, shortage of budget, too much attention paid for short term gain and absence of competitive market environment. Moreover, the foreigners give priority to work with their own countries' universities and assume that the linkage with universities consumes their productive time and lacks concern to solve the local challenges. Furthermore, their demand of manpower goes beyond the skills of local graduates. In conclusion, the factors that affect the university-industrial park linkage can be categorized in to two major categories; as internal and external.

Interviews conducted with a senior university instructor indicate that the challenges are raised from both the industrial parks and the universities sides. From the industrial parks side, there is lack of trust and confidence on the local universities. The major reason for this is the business orientation that the industrial parks established for and the universities program lacks alignment. No platform has been created so far and the universities capacity were also hide. This in turn affects the image of local universities. Besides, there is lack of system of competitiveness. If

there is competitiveness, the industrial parks may be interested to come to the universities to get support. However, the industrial parks can exist and make profit even they perform below their full capacity. Thus they were reluctant to establish linkage with the universities and invest their money, time and effort.

From the university side, there is also lack of motivation to utilize the skills and knowledge to solve the industrial parks problem. Some university teachers may exert efforts to approach industrial parks individually. But there is no strong system of linkage at the university level to reap better benefit. Additionally, the universities do not involve industrial parks during curriculum design. The mismatch between the skills and knowledge of graduates and the needs of industrial parks is resulted from absence of joint collaboration. If the universities involve people from industrial parks during curriculum designing and planning, the industrial parks would have the opportunity to understand the capacity of universities and belongingness. In short, there is no platform to engage the three actors (government, university and industrial parks) for integrated interaction. The findings in this regard, were consistent with the results of STEP-GIZ, MoE (2018) that time and budget constraint; motives were some of the obstacles for the two actors' linkage.

Interview conducted with industrial park representative indicated that:

> *The major barriers for the linkage are absence of binding guidelines and incentive mechanisms for the linkage. Another obstacle for the linkage is students' behavior. The students come from the universities for internship program lacks interpersonal skills, punctuality and do not obey the rules and regulations of the industrial parks. Conflicts arise between the supervisors of the industrial parks and the students come for internship. The students consider themselves as they are highly educated people and reflect boasting on workers (Informant 2, June 7, 2021).*

Moreover, the Ethiopian education system focuses on theory than practical exposure. The positions that need skilled manpower are occupied by foreign experts. But unemployment issues are the most common problem in Ethiopia. This is resulted from the quality problem and the mismatch between the skills and knowledge of graduates and the demand of the production sector.

On the other hand, the leaders are expected to develop strategies or approaches to accomplish planned activities. In relation to this, most of the respondents responded that the management had short comings to establish approaches to form interface with the industrial parks. The mean value (m=2.32) is also less than the ideal mean (M=3.00).

To improve the acceptance of graduates, build the image of universities and ultimately to satisfy the needs of industries, the leadership should assess the relevance of programs. In this regard, abundant repliers forwarded that the effort done by the leadership to assess the importance of the programs was below the expected status. Its mean value (M=2.45) was below the ideal mean (3.00). A similar response pattern can be seen in item 10 which majority of the respondents reported that the budget allocated to the activities of the UIL was not satisfactory.

In conclusion, the efforts of the leadership in planning, monitoring, evaluating, coordinating, and assessing the activities of UIL were below the required level. Besides, allocation of optimum budget to the UIL was below the required level. Moreover, the approaches followed did not bear fruit to create favorable condition for the university-industrial park.

In general, the extent to strengthen the linkage had limitations and it was found at the infant stage. The two entities focus on establishing UIL offices to facilitate internship programs and signing memorandum of understanding. The information gathered suggests that the management bodies gave less attention to the university-industrial parks interface. In other word, it infers that the engagement of the management to consolidate the linkage had limitations. The major factors that hider the linkage were goal difference between the entities or lack of common goals, poor communication, lack of leadership skills, lack of commitment, the power to exercise linkage concentrates at the level management, wrong perception of the industry that they assume as the universities are the only beneficiary, and the government focuses on hard currency.

It was also requested the respondents to reflect their observation about the policy framework to establish linkage with the industrial park. Accordingly, few respondents replied that there was no policy framework to administer the UIPL. Other respondents remarked that there was a policy framework but it was not implemented properly and effectively. Still, other respondents reported that previously there has been a directives prepared by the Ministry of Science and Technology

on establishment of cluster forums. Currently, there is an ongoing regulation to enact by the Council of Ministers which is entitled as “Education, Training and Research Institutions and Industry linkages” developed by the Ministry of Science and Higher Education.

4.6. Strategies to Improve the Linkage of University-Industrial Park

The experience, benefits, and challenges of university-industrial parks gathered from respondents were discussed so far. This sub-topic deals with presenting the mechanisms collected open ended responses and interviews. To open ended question items the respondents suggested that to improve the linkage the triple-helix model approach should be implemented. Therefore, at national level, the government is expected to create structure and platform and avoid bottle necks, allocate adequate budget, prepare workable guidelines and regulations, provide intensive schemes to industrial parks to simplify the access, establish a unit which control and monitor the effectiveness of such linkages.

Moreover, at institutional level, the universities should assess their internal strength and weakness, knock the doors of the industrial parks, improve their academic and research capabilities to solve industrial park problems, establish better communication channel, realize tangible results to be trusted by the industrial park people, improve infrastructures, involve the middle and lower level managers, engage industry people on curriculum development, motivate staff to work with industrial park, initiate projects which can benefit the industrial parks, implement the policy effectively, realize proper coordination, and give special attention for mutual benefit than unilateral gain.

Interviews were administered with customer service senior expert, UIL office, IPDC and senior instructor suggested the points here under to solve the challenges and improve the linkage between the universities and industrial parks. Accordingly, the government should implement incentive mechanisms (like tax relief and duty free) and prepare guidelines for the interface. The government should provide follow up and supervision until the two entities take the responsibility fully. It is better to focus on pulling than pushing approach to improve the linkage. The government also create platform to bring the university and TVET sectors together and work jointly to fill the needs of the industrial parks. Similarly, the universities should improve their

internal quality and performance and open their doors to work together with the TVET so as to ultimately combine their theoretical concepts with the practical and concrete skills of TVET. Likewise, at the industry level, the industrial park should be willing to work with the universities, allocate grant for research, built up trust on universities, assign personnel who can coordinate the UIPL, disclose their researchable problems and give assignments to the universities to find solutions, create an open system of approach, and develop positive attitude on the skills and knowledge of university people than blind thinking.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

This final chapter deals with presenting the summary of the key findings of the study, conclusions drown on the bases of the study findings and appropriate recommendations were forwarded for future improvements in line with the findings of the study. The analysis in this study has commence to address the topic belong to the practice and challenges of university-industrial park linkages depending on the three actors.

5.1. Summary

The aim of this research was to investigate the practice of university-industrial park linkage in some selected public universities in Addis Ababa. To attain this aim, the study extended its effort to answer the following basic research questions.

1. To what extent does the university-industrial park linkage exist?
2. What types or areas of linkages do exist and what benefits have been obtained from the university-industrial park linkage so far?
3. What are the major challenges that hinder the university-industrial park linkage?

To get appropriate answers for the above research questions, the study passed through different steps and followed systematic approach. The main steps carried out in this study from the beginning to the end presented here under. In the first chapter of this study, the background of the study, the statement of the problem, objectives, significant, limitation and delimitation of the study and operational terms were presented. In the background of the study, global and local trends, practices and challenges of university-industry were addressed. Next to this, the statement of the problem was discussed. In this part, the magnitude and depth of the existing problem and the gaps were presented in detail.

In chapter two, related literatures on the topic of the study was reviewed and presented. The first section of the literature review deals with the theories of human capital. Under this section, various issues of human capital were addressed. The concept of triple helix model, system

theory, conceptual issues of industrial parks standing from the international and local perspective, benefits, areas and challenges of university-industry were also discussed.

The third chapter is bout research design and methodology. Accordingly, the study employed mixed research approach. Moreover, descriptive survey method was applied for this study. The major sources for the quantitative data of the research were deans, chairs, department heads, and instructors. To get appropriate information on the issue, questionnaires (closed and open ended questions) and interviews were mainly used as data gathering tools. To this effect, 95 out of 110 questionnaires were filled in and returned. The respondents of this study were selected using purposive and simple random sampling techniques.

To triangulate the data collected through questionnaires interview was conducted with UIL directors, senior instructor who had the exposure, representatives of IPDC and industrial parks. The interviewees from the IPDC and industrial parks were also selected purposively. Formal and Semi-structured interview questions were employed for the interview. The other section of the third chapter deals with data analysis. The information gathered through questionnaires was analyzed using descriptive statistics and independent sample t-test using SPSS version 24 (at alpha = 0.05). Thus mean and percentage were employed. Tables and bar graphs are used to present the data. The qualitative data presented with descriptive and narrative statements. The key results or the findings of the research drown from the analysis of the data addressed below.

1. Both AAiT and AASTU, the site of this study, academic staff have MSc and PhD with the capability to establish university-industry linkage. However, AASTU has shortage of PhD holders and senior academic staff to set up linkages.
2. The involvements of the industrial parks in U-IP linkage activities were limited. Besides, the universities have limitations in implementing and evaluating the UIL plan, encouraging staff exchanges between the two actors and awarding the planned UIL activities to the people of the industrial parks.
3. The assessment of the skills of graduates and the needs of industrial parks by the universities was inadequate. However, the universities had better performance in organizing educational visit to the industrial parks.

4. There was no platform for U-IP interaction at the national level. The limited linkages between the two actors have been insisted on the efforts made by individuals and institutions. The linkage among the government, university and industrial parks may be considered as laissez fair model in which the actors function separately with demarked boundaries.
5. The interaction between the universities and industrial parks did not bring the expected benefits. In one hand, the benefits gained by the universities were limited to students' internship. On the other hand, the benefits obtained by the industrial parks were also limited to some consultancy services. In short, the finding of the study indicates that internship program and consultancy service were the dominant mechanisms for the U-IP linkage.
6. The major challenges that hinder the U-IP linkage can be seen from perspectives of the three actors. These are:
    1) **University perspective, the main challenges were:**
        - poor communication with industrial parks,
        - linkage practices were often initiated for the sake of grant seeking
        - presence of conflicting values with the needs of the industrial parks
        - inadequate leadership support and initiation,
        - misalignment of programs to the labor market,
        - paying too much attention to the theoretical aspects than the practical exposure,
        - mismatch between the skills of graduates and the needs of labor market,
        - poor infrastructure, and
        - over teaching loads, time, financial, and workable policy constraints
    2) **Industrial parks perspective, the dominant identified barriers were lack of:**
        - willingness to interact with the universities,
        - the industrial parks usually has a profit- making motive,
        - presence of conflicting values with the needs of the industry needs,
        - trust and confidence on the capacity of local universities,
        - system of competitiveness, and
        - emphases on ling-term gains

3) **Government perspective, the major limitations were absence of:**
    - assessment and need analysis prior to establishing linkages between universities and industries
    - guidelines for the linkage
    - incentive mechanisms to get the interest of the industrial parks
    - follow up of the linkages

7. The efforts made by the universities management were did not go beyond signing memorandum of understanding and educational visit.

1.2. Conclusions

Depending on the findings of the study, the following key conclusions were drawn. It is presented hereunder.

There were profound gaps in UIL joint panning, implementation and evaluation of linkage activities. The university industry linkage was limited in internship and consultancy services. As a result, the practical linkages between the two actors (university and industrial park) were unsatisfactory. The universities initiations to involve the industrial parks in curriculum preparation, industrial need assessment and in other determinant activities were lacking. This in turn eroded the belongingness and trust of industrial parks. The benefits gained by the two actors were below the expectations. In principle, the cooperation between the universities and industrial parks are complementary each other. However, the unsatisfactory linkage activities accomplished by the universities results the dissatisfaction and in confidence of industrial parks on the universities. In general, the linkage among the government, university and industrial parks may be considered as laissez fair model in which the actors function separately with demarked boundaries.

There were dominant barriers or challenges arisen from the three actors (government, university and industrial parks). The barriers observed from the government side were absence of guidelines, need assessment and analysis, and incentive mechanisms to realize effective linkages. From the university side the major challenges were lack of leadership commitment, misalignment of programs with the industry sector, conflicting of values, presence minimized

common interest and mismatch between the skills acquired by graduates and the needs of the industrial parks, poor communication and over teaching loads to name.

From the industrial parks side, unwillingness to link with universities, lack of trust on universities capacity, focusing on short term gain, lack of competitiveness and this leads industrial parks to make profit without competition and push them to reject linkages. There is well established trend to assess the skills and knowledge of graduate students and the demands of industrial parks by the universities. Universities pay too much attention for the theory. On the contrary, little attention has given to practical exposure. Forth more, the universities management renders a significant amount of time on routine tasks than on strategic issues.

1.3. Recommendations

Based on the conclusions presented above, the fowling recommendations were forwarded to the concerned and major stakeholders of the linkage so as to solve the challenges of the university-industrial park.

A) For universities:

1. It is known that the industrial parks have their own priorities and focus. Hence, the universities should focus on win-win strategies to realize mutual benefits rather than win-lose approaches.
2. Participation in any activity enhances the sense of belongingness and initiative. It also enables to include the interest of different stakeholders. Therefore, the universities should enhance involvement of the people of industrial parks in UIL plan, implementation and evaluation and curriculum design and other related linkage activities.
3. It is believed that the business sectors always strive to maximize their profit margin. Thus the universities should help the industrial parks to alleviating the problems that hinder to produce quality products and services.
4. It is strongly recommended that the universities should improve their communication, align their programs with the demand of the labor market, and provide corrective actions for limitations based on the impacts observed by their graduates.

5. The industrial parks may judge the capacities of the universities based on the quality of graduates and their problem solving ability. Thus the universities should improve their internal and external performance to build their image.
6. The university management should reflect strong commitment and initiation to enhance the teaching learning process so that to establishment better collaboration with the industrial parks.

B) The Industrial Parks:

1. The outputs of universities such as graduates, research works, knowledge etc. are inputs of industrial parks. Hence to get the required inputs that satisfy their needs, the industrial parks should be willing and open to interact with the universities. It is also advisable to disclose the industrial parks problems to the universities to come up with some sort of solutions and to test their capabilities.
2. To improve the capacity of universities, get qualified graduates and research output the industrial parks should enhance the internal capacity of universities by allocating budgets based on their priory of needs.
3. To bring sustained linkage with the universities, the industrial parks shall focus on long-term gains in addition to short-term benefits.
4. There is always a room for improvement. Therefore, the industrial parks should strive for system of competitiveness and sustained improvement.

C) The Government Bodies:

1. The government is assumed as one of the decisive actors in the case of university-industry linkage. As a result, the government should play a pivotal role in the formation of triple helix model of interaction among the government, the universities and industrial parks.
2. It is recommended that the government create conducive platform by imposing guidelines for effective linkage and follow up the implementations until it reaches the required level. It is better to employ pulling approach rather than pushing. For instance, it should introduce some sort of incentive mechanisms to the industrial parks to initiate interactions between universities and industrial parks.

3. It is recommended that the government should take need assessment and analysis during establishing university-industrial park linkage.
4. The government should establish sectorial cluster forum that enable the universities and the TVET work jointly and ultimately solve the conceptual and practical demands of the industrial parks.
5. The government should enhance to create clear understandings between the universities and industrial parks.

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Appendix A: Questionnaires

Addis Ababa University

School of Graduate Studies

College of Education and Behavioral Studies

Department of Educational Planning and Management

Questionnaire

Dear Respondent,

The purpose of this questionnaire is to collect data for the study entitled **"**The practice and Challenges of University-Industrial Park Linkage: in some selected Governmental Universities of Ethiopia**."** To achieve the aim of the study, your genuine response will play an indispensible role for the success of the study. Therefore, you are kindly requested to fill the entire questionnaire. For the alternative items, please put **"X"** or **"√ "** mark on the given boxes. Please also give your responses briefly for the open-ended items of question. You don't need to write your name on this questionnaire.

NB. While you fill the questionnaire please consider the university-industrial park linkage.

Thank you for your cooperation, the researcher.

1. . General Background

1.1. Your university _____

1.2. College/school/institution _____

1.3. Department _____

1.4. Sex: Male ☐ Female ☐

1.5. Educational qualification

BA/B.Sc. degree ☐ MA/M.Sc. degree ☐

PhD ☐ Other, please specify _____

1.6. Academic rank:

Graduate assistant ☐ Assistant lecturer ☐ Lecturer ☐

Assistant professor ☐ Associate professor ☐ Professor ☐

Others, please specify _____

1.7. Current position/occupation:

College/School dean ☐ Department head ☐

Coordinator ☐ Instructor ☐

1.8. Year/s of service in university _____

1.9. Area of specialization _____

2. **The extent to which the university-industrial park linkage (UIL) practices**

The purpose of the items presented hereunder is to examine the extent to which the university-industrial park linkage exists. Please put your response to each of the items listed below and put **"X"** mark in the given boxes. The weight of value for **5 = Very high, 4 = High, 3 = Average, 2 = Low, 1 = Very low.**

No	Items	Rating				
	My university/ the university that I am working:	**5**	**4**	**3**	**2**	**1**
2.1.	Involves industrial park representative/s in UIL plan preparation	☐	☐	☐	☐	☐
2.2.	Implements the UIL plan effectively	☐	☐	☐	☐	☐
2.3.	Evaluates the effectiveness of the UIL plan	☐	☐	☐	☐	☐
2.4.	Assesses the skills of graduates & the needs of industrial parks	☐	☐	☐	☐	☐
2.5.	Involves industrial park representatives in curriculum development	☐	☐	☐	☐	☐
2.6.	Establishes strong linkage with the industrial park	☐	☐	☐	☐	☐
2.7.	Allocates sufficient seed fund for the UIL	☐	☐	☐	☐	☐
2.8.	Encourages staff exchange between the university & the industrial park	☐	☐	☐	☐	☐
2.9.	Creates direct graduate employment opportunities in industrial parks	☐	☐	☐	☐	☐
2.10.	Mobilizes the industrial park to sponsor the university research works	☐	☐	☐	☐	☐
2.11.	Aware the main activities of the university to the industrial park	☐	☐	☐	☐	☐
2.12.	Organizes educational visit to industrial park	☐	☐	☐	☐	☐

2.13. Please specify, if there is other university-industrial park linkage practices in your university _____

3. Areas of University-Industrial Park Linkage

In which areas of linkage presented below does your university have better linkage with the industrial park? Please put your level of agreement of each of the items. The weight of value for **5 = Very High, 4 = High, 3 = Average, 2 = Low, 1 = Very Low**.

No	Areas of linkage	Rating				
		5	4	3	2	1
3.1	Consultancy service	☐	☐	☐	☐	☐
3.2	Industrial park –sponsored research	☐	☐	☐	☐	☐
3.3	University-industrial park cooperative research	☐	☐	☐	☐	☐
3.4	Staff exchange between the university and industrial park	☐	☐	☐	☐	☐
3.5	Collaborative curriculum development	☐	☐	☐	☐	☐
3.6	Internship programs for students	☐	☐	☐	☐	☐
3.7	Commercialization of research output	☐	☐	☐	☐	☐
3.8	Provision of collaborative training program	☐	☐	☐	☐	☐
3.9	Establishment of joint innovation center	☐	☐	☐	☐	☐
3.10	Patent licensing	☐	☐	☐	☐	☐
3.11	Technology business incubation	☐	☐	☐	☐	☐
Please, specify (if any) _____		☐	☐	☐	☐	☐

3.12. From the above areas of linkage, which areas are more practiced in your university? Please write your response starting from the most frequently practiced to least one.

_____

_____

4. Benefits obtained from the university-industrial park linkage

4.1. What are the major benefits gained by the university from the cooperation?

_____

_____

4.2. What are the main benefits obtained by the industrial-park from the linkage?

_____

5. Challenges that impede the university-industrial park linkage

The factors that hinder the university-industrial linkages are presented in the table below. Please rate your response for the factors that affect the linkage. **5 = Very high, 4 = High, 3 = Average, 2 = Low, 1 = Very low.**

No	Items	Rating				
		5	4	3	2	1
5.1.	Lack of willingness of the industrial park	☐	☐	☐	☐	☐
5.2.	Irrelevance of programs to the labor market	☐	☐	☐	☐	☐
4.3.	Lack of trust and confidence on university's capacity	☐	☐	☐	☐	☐
4.4.	Inadequate leadership support and initiation	☐	☐	☐	☐	☐
4.5.	Poor communication between the university & industrial park	☐	☐	☐	☐	☐
4.6.	Inadequate budget allocation for linkage	☐	☐	☐	☐	☐
4.7.	Absence of guidelines/policies at the national level	☐	☐	☐	☐	☐
4.8.	Existence of difference in goal and priorities	☐	☐	☐	☐	☐
4.9.	Over teaching loads/workload	☐	☐	☐	☐	☐
4.10.	Cultural difference between the university & industrial park	☐	☐	☐	☐	☐
4.11.	Poor research infrastructure	☐	☐	☐	☐	☐
4.12.	Mismatch between the skills and the need of the labor market	☐	☐	☐	☐	☐
4.13.	Illiteracy of industry owners	☐	☐	☐	☐	☐
4.14	Industries give much emphasis on profit maximization	☐	☐	☐	☐	☐
Please, specify (if any)						

5.17. From your point of view, what are the major factors that affect the university-industrial park linkage in the university you are working? Please explain your response under the internal and external factors.

4.17.1. Internal (University) factors

_____

_____

4.17.2. External (outside of the university) factors

_____

_____

4.18. Do you think that the ownership of the industrial park affect the linkage? If so please explain how the foreign owners affect the relationship between the local university and industrial park?

_____

_____

5.11. According to your point of view, to what extent the management of your university is effective to strengthen the university-industrial park linkage? Please explain your response briefly.

_____

_____

5.12. Regarding the linkage between the university and industrial park, what are the main factors that affect the interface?

_____

_____

5.13. Is there policy framework that facilitates the university and industrial park cooperation? Please give your response _____

6. Strategies to improve the university-industrial park linkage

6.1. To improve the linkage between the university and industrial park, what should be done by:

- the government _____
- the university _____
- the industrial park _____

Thank you for your time and cooperation!

Appendix B: Interview Questions

Addis Ababa University

School of Graduate Studies

College of Education and Behavioral Studies

Department of Educational Planning and Management

Semi-Structured Interview Guiding Questions for UIL Directorate Office

The following semi-structured questions are designed to investigate the practices and challenges of the university- industrial park linkage: in some selected university of Ethiopia.

1. How do you explain the existing university-industrial park linkage?
2. What benefits have been obtained from the university-industrial park linkage so far?
3. What are the major areas of university-industrial park linkage that exist currently?
4. What are the major challenges that hinder the university-industrial park linkage?
5. In order to improve the university-industrial park linkage, what should be done by the government, the university and the industry?

Appendix C: Interview Question

Addis Ababa University

School of Graduate Studies

College of Education and Behavioral Studies

Department of Educational Planning and Management

Semi-Structured Interview Guiding Questions for Industrial Park Development Corporation

The following semi-structured questions are designed to investigate the practices and challenges of the university- industrial park linkage: in some selected university of Ethiopia.

1. The current and planned industrial parks are constructed near to the top ten public universities. Do you think that the university-industrial park linkage is successful?
2. If the linkage between the university and industrial park is unsatisfactory so far, what are the major challenges that hinder the linkage?
3. Is there a guideline or policy framework to strengthen the relationship between the university and industrial park?
4. In order to improve the university-industrial park linkage, what should be done by the government, the university and the industry?

Appendix D: Interview question

Addis Ababa University

School of Graduate Studies

College of Education and Behavioral Studies

Department of Educational Planning and Management

Semi-Structured Interview Guiding Questions for Industrial Park Representatives

The following semi-structured questions are designed to examine the practices and challenges of the university- industrial park linkage: in some selected university of Ethiopia.

1. Do you think that the university-industrial park linkage is fruitful?
2. If the linkage between them is unsatisfactory so far, what are the major challenges that hinder the linkage?
3. Do the skills acquired by graduates relevant to the demands of the industrial park?
4. In order to improve the university-industrial park linkage, what should be done by the government, the university and the industry?