MANAGING UNIVERSITY-INDUSTRY LINKAGE IN GOVERNMENT UNIVERSITIES OF ETHIOPIA: CHALLENGES AND OPPORTUNITIES

By

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DECLARATION

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I declare that the above dissertation/thesis is myown work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

_____ 22 February 2018

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DEDICATION

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ACRONYMS AND ABBREVIATIONS

AAU	–	Addis Ababa University
AAU	–	Association of African Universities
ADEA	–	Association for the Development of Education in Africa
ANoVA	–	Analysis of Variance
CSA	–	Central Statistical Agency
EGSSCE	–	Ethiopian General Secondary School Certificate Exams
ESDPs	–	Education Sector Development Programmes
ETP	–	Education and Training Policy
FDRE	–	Federal Democratic Republic of Ethiopia
FGI/D	–	Focus Group Interview/Discussion
GDP	–	Gross Domestic Product
GER	–	Gross Enrolment Rate
GPI	–	Gender Parity Index
HDI	–	Human Development Index
HEI	–	Higher Education Institutions
IMF	–	International Monetary Fund
IPR	–	Intellectual Property Rights
IUCEA	–	Inter-University Council of East Africa
KENET	–	Kenya Education Network
MoE	–	Ministry of Education
MoST	–	Ministry of Science and Technology
MoU	–	Memorandum of Understanding
MPI	–	Multidimensional Poverty Index
NER	–	Net Enrolment Rate
NGO	–	Non-Government Organisations
PASDEP	–	Plan for Accelerated and Sustained Development to End Poverty
PCA	–	Principal Component Analysis
PSLCE	–	Primary School Leaving Certificate Examination
SNNP	–	South Nations Nationalities and People
SPSS	–	Statistical Packages for Social Sciences
TGE	–	Transitional Government of Ethiopia
TTOs	–	Technology Transfer Offices

TVET	–	Technical and Vocational Education and Training
U & I	–	University and Industry
UIL	–	University-Industry Linkage
UILOs	–	University-Industry Linkage Offices
UK	–	United Kingdom
UN	–	United Nations
UNDESA	–	United Nations Department of Economics and Social Affairs
UNDP	–	United Nations Development Programmes
UNESCO	–	United Nations Education Scientific and Cultural Organisation

ABSTRACT

This study set-out to examine how university-industry linkage (UIL) is managed in government universities of Ethiopia to contribute to the economic development of the country. Basic questions related to the level of management of UIL, areas of linkage, benefits obtained so far from this partnership, challenges to the proper management of UIL, and the existing opportunities for promoting UIL were raised. In addition to this, strategies for strengthening UIL were also dealt with.

In relation to this, the study was framed with the system theory viewpoints and human capital theory viewing universities as a system linked to its external environment like industries. As a model, interactive/balanced type of Triple Helix model was used as it integrates the activities of the government, universities and the industries. Moreover, this study reviewed global perspectives on UIL and an overview of the study context with greater emphasis on higher education reforms and proclamations.

Philosophically, this study followed pragmatism research paradigm using mixed research approach. It also employed concurrent/parallel/convergent design in which both quantitative and qualitative data were collected simultaneously, interpreted separately and combined at the time of discussion for better understanding of the problem. Equal importance for both data sets was given. Data were gathered from 99 college deans and department heads, 200 instructors and 316 prospective graduates. In addition to this, 23 interviewees from UILOs, industries, MoE, and MoST took part in this study. Moreover, two focus group discussions were also conducted with the university alumni and data were gathered through survey questionnaires, semi-structured interview, FGD question guides and document reviews.

The study result indicated that both quantitative and qualitative data support one another. It was found out that UIL was at its infant stage of development in government universities of Ethiopia with limited areas, dominated by students' internship. Ethiopian government universities have a link with the industries in areas of some limited joint research projects, consultancies and capacity building. Consequently, universities benefitted by attaching their students with the industries and students got practical exposure to the real world of work. Industries also benefitted from the training provided

to them, consultancies and joint research projects.

On the other hand, UIL in government universities of Ethiopia was challenged by institutional bottlenecks, policy-practice gaps, contextual variation and information gaps, finance and awareness related caveats, work overload, and facility related hurdles. Moreover, lack of trust and commitment between U & I, lack of commitment and support from the leadership of both universities and industries, and the reluctance of the local industries to work with the universities remained a big rift to UIL.

This study also sheds light on the expansion of universities and industries in different parts of the country as the opportunities to be tapped to promote UIL. Further, the attention of the government by designing different policies, strategies, directives and conferences was taken as the opportunity. As a major contribution, this study came up with the model that was designed to improve the practice of management of UIL in government universities of Ethiopia. To overcome the above challenges and to make use of existing opportunities, it was recommended that improving leadership and management related challenges through joint planning, organising, staffing and decision-making. Moreover, it was highly laudable to make a paradigm shift in the roles of universities from teaching dominated to research and innovation universities. Finally, bridging policy-practice gaps, increase networking, arranging various sensitising and advertising programmes and creating a further avenue for more research were commented.

Keywords: University-industry linkage, systems theory, human capital theory, Triple-Helix model, Pragmatism, mixed approach, innovation, technology transfer, paradigm shift, Management

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CHAPTER ONE
BACKGROUND, PROBLEM STATEMENT AND AIMS

1.1. BACKGROUND TO THE STUDY

Universities have long been recognised as sources of knowledge creation, innovation and technological advances (Ssebuwufu, Ludwick & Beland, 2012: 8; Khan & Anwar, 2013: 268; Rodrigues, 2009: 3612; Adeoti, 2009: 378; Abraham, 2016: 2). They play pivotal roles (Ahmed & Jumani, 2013: 201) in economic transformation through innovation and their ability to change the patterns through research, testifies the old nations and brings the ultimate truth of man (Khan & Anwar, 2013: 268). In this regard, the role universities play in socio-economic development is mainly shown by the value attributed to them as major *loci* of (scientific) knowledge generation and dissemination (Rodrigues, 2009: 3612). These enhanced roles increase the innovation capacities of universities in knowledge-based society by forming direct links between the universities and industries (Ahmed & Jumani, 2013: 201; Abraham, 2016: 2). A study by Adeoti (2009: 375) confirms that the increasing roles of knowledge in development suggest that universities and industries have to interact not only to create but also to employ knowledge for development.

In the 21stcentury, where the creation of new knowledge is a source of survival of a nation, and higher education institutions are mainly in charge of creating this knowledge required for development. Consequently, synergies between universities and the industries are key to this success in attaining this end (Khan & Anwar, 2013: 271; Abraham, 2016: 2). Collaboration between universities and industries is crucial for skill development, for generation, acquisition and adoption of knowledge and the promotion of entrepreneurship (Guimon, 2013: 1). Moreover, the importance of university-industry linkage is justified on the ground that universities create new knowledge and industry provides space for checking the validity and reliability of this knowledge (Khan & Anwar, 2013: 269).

In a similar vein, global economy favours competent, knowledgeable and technologically advanced citizens produced by universities who can best fit to the economic environment. In this respect, higher education institutions (HEI) are

increasingly viewed as central to the national strategies for securing shares in the global market and universities as the repositories of valuable human capital to support national development (UNESCO, 2012: 1; Hernes & Martin, 2000: 9). In other words, universities play a key role in producing the required workforce that can boost the economic development of a nation. This is the major and basic interface between universities and the industries. Consequently, the university is a venue where knowledge grows, and industry is a place where this knowledge is applied and gives output to the society and the nation (Khan & Anwar, 2013: 270).

Cognisant of this, governments highly acknowledge the importance of HEIs as strategic actors in national and regional economic development, given their potential to upgrade knowledge of labour force and to contribute to produce and process innovation through technology transfers (Hernes & Martin, 2000: 11). They also call universities to facilitate the shift to a knowledge-based economy and high technology through effective linkage and industry to ensure that their countries have a competitive edge in the global market (UNESCO, 2012: 1). These expectations require well-committed management both at the university and industry level who can fine-tune the overall objectives of the university towards this end.

As there is a growing concern for an educated workforce that the economy demands, the Ethiopian government has been working on the expansion of universities in different parts of the country. This step is vital as the educated human resources lie in the heart of development in organising other resources. Of course, this was supported by different proclamations and policies encouraging the involvement of universities in technology transfer in many countries (D'Este & Patel, 2007: 1296).

As is the case internationally, the objectives of the Ethiopian universities are to train mature citizens, carry out research and to provide consultancy services to make significant impacts in the country's development in various sectors of the economy (Daniel, 2006:4; TGE, 1994b: 24). However, the expansion will bring about the desired change, if and only if, the linkage between universities and industries is strong and properly managed.

Historically, it is argued that the introduction of a modern type of education in Ethiopia

has counted more than a century. However, secular higher education was only initiated with the founding of the university-college of Addis Ababa in 1950 (Saint, 2004: 84). Since then, the number of universities has remained only two until the downfall of the military government regime in 1991. Following this, the government of Ethiopia has been extensively working on the expansion of universities to fill the gaps of different sectors with appropriate human power. Moreover, the policy document emphasised the linkage between education, training, research and development in resolving the deep-rooted societal problems of the country (TGE, 1994b: 25). Similarly, Ethiopian science and technology commission establishment proclamation No 91/1994 gave responsibility to the commission to create strong linkages among education, research and development and production activities (TGE, 1994c: 359). More recently, the powers and duties of the executive organs of the government urged the ministry of science and technology (MoST) to facilitate interaction and collaboration among government and private higher education and research institutions and industries with the view to promote research and technological advancement (FDRE, 2015: 8614). Both proclamations of HEIs (No 351/2003 and 650/2009) state the need to create collaboration with industries through research, consultancy and technology transfer activities (FDRE, 2003: 2237; FDRE, 2009: 4991). However, it is argued that all these efforts lack practical implementation as the designed policies at the central level did not properly put into practice as it remains broad and lacks contextualisation (Abdu, 2013: 152).

Furthermore, efficient utilisation of human capital requires proper management of university-industry linkages. In Ethiopia, total tertiary enrolment in universities and non-university tertiary institutions, both public and private, surged from 43,843 in 1997/98 to 147,954 in 2002/2003 (MOE, 1998 & 2003), more than tripling in just five years. The annual enrolment growth rate of 28 percent was possibly the highest in the world during this period (Saint, 2004: 85). Moreover, data obtained from the ministry of education revealed that the number of graduates from government universities was 53,874 (42,255 males and 11,619 females) in the year 2009/10 (MoE, 2010a: 58). More recently, the data show that the total enrolment increased to 729,028 and the number of students who graduated from the system with undergraduate degree reached 155,055 per year (MoE, 2016: 147). The huge workforce that strives to join the job market requires adequate training that acquaints them with better skills and

knowledge to remain competent in the domestic and international labour markets. Consequently, this calls for creating a strong university-industry linkage that fosters innovation and technology transfer activities.

The Education and Training Policy (ETP) currently in use is implemented in successive education sector development programmes (ESDPs). The fourth stage of this programme (ESDP-IV), planned to increase the total enrolment of undergraduate higher institutions (regular government programme) from 185,788 in 2009/10 to 467,445 in 2014/15 (MOE, 2010b: 64). This change in the educational pyramid of the country will have both opportunities and challenges, which need for competent management to link the graduates with the emerging labour market in the country. However, a study made shows that the low quality of university graduates (Abaya, 2014: 9; Kebede, 2014: 6: Mulu, 2012: 22; Reisberg & Rumbley, 2010: 1) has resulted in an increase in the number of graduate unemployment in Ethiopia calling for the practical improvement of the skills of graduates (Nayak, 2014: 34).

Despite this, there is little research done in this area in Ethiopia. Daniel (2006) conducted university-industry linkage in Ethiopia with special emphasis to establish resource centre between the two. A study conducted by Kannan (2012) was also confined to Dilla, one of the towns found in the southern part of the country, confirming that there is a gap in linking universities with the industries. Hence, it is difficult to draw a holistic picture of the issue at the country level. Moreover, he saw from the benefits as the results of linkage and in terms of parties taking the initiative in forging the partnership.

A study made by Abdu (2013: 10) assessed university-industry partnership (UIP) focusing mainly on technology transfer and internship aspects of Engineering Education. He also explored the organisation capacity of Ethiopian universities in relation to the existing policy frameworks. However, this study tries to investigate university-industry linkage from management perspective to fill the knowledge gap.

1.2 THE ETHIOPIAN CONTEXT

Located in the horn of Africa, Ethiopia has the total land area of 1,251,282 square

kilometres, comprising of central highland mass surrounded by lowlands (Ahmed, Angeli, Biru, Salvini, 2001: 3). This makes it the seventh largest country in Africa. Of this, two-thirds are suitable for production (MOE, 2010: 10).

In addition to this, Ethiopia is the second most populous country in Africa following Nigeria (UNDESA, 2010: 1; Alemayehu & Yihunie, 2014: 2) with the total projectedpopulation of 104,957,000 in 2017 (UNDESA, 2017: 18) and assumed to be 133.5 million by the year 2032. Its population is one of the fastest growing in the world (World Bank, 2005: 4) at 2.6 percent per annum (MOE, 2010b: 10; Alemayehu & Yihunie, 2014: 2). It is a land of ethnic diversities speaking over 100 languages and dialects (Ahmed, *et al.,* 2001: 3; World Bank, 2005: 3). The country is currently adapting the federal system of government (World Bank, 2005: 4; MOE, 2010b: 8). It is committed to decentralisation that provides each region with autonomy and accompanied by fiscal decentralisation, which devolves decision-making powers to lower tiers of the government (MOE, 2010b: 10).

Agriculture is the dominant economic activity, which comprises 84 percent of the total population (MOE, 2010b: 10). As put by Saint (2004: 83), 80 percent of the labour force is engaged in Agriculture, much of which is of subsistence in nature. Sector-wise, Agriculture, industry and services contribute 48, 14, and 38 percent for GDP respectively (Joshi & Verspoor, 2013: 3).

Following the government change in Ethiopia in 1991, education policy was also changed from a centralised to a decentralised system; from 6-2-4 structure to 8-2-2, which indicates primary, general secondary and preparatory levels respectively (TGE, 1994: 14). Higher education expansion and reform programme of impressive dimension were also made (Saint, 2004: 83). In its report, the Ethiopian Ministry of Education (MOE, 2010b: 7) has stated the goal of higher education as follows:

> *…the goal is to develop highly qualified, motivated and innovative human resources, and produce and transfer advanced and relevant knowledge for socio-economic development and poverty reduction with a view to turning Ethiopia into a middle- income country by the year 2025.*

To achieve these goals, the government committed a huge amount of money to put the plans into practice. Twenty-five percent of the total expenditure of the country's annual budget is allocated to the education sector (Nganwa, 2013: 13). To realise the development objectives, great emphasis has also been given to universities. Currently, the number of universities reached 44 (which were 31 at the time of data collection for this study) from the former two universities at the downfall of the military government. With the expansion of universities again, the number of graduates increased from year to year. This has both opportunities and challenges that need to be addressed.

1.3 PROBLEM STATEMENT

With the rapid expansion of universities and increased market competitiveness in the global world, there is a challenge of managing the linkage between universities and industries. Although the problem has global coverage, the case is much worse in developing countries than developed world (Guimon, 2013: 5). For instance, the study made by Ssebuwufu, *et al.* (2012:12) states the challenge of university-industry linkage as:

> *African universities have often been criticized as ivory towers that churn out graduates and research that are irrelevant to the needs of the employers and the social, economic and technical challenges facing African economies.*

Similar to the above findings, a study made in Pakistan shows that HEIs are criticised for producing degree holders without adequate training for the global market (Khan & Anwar, 2013: 270). By citing their government's report as a source, they added that "publically funded institutions get an education of mediocre quality, which does not prepare them to participate effectively in the economic, political and social life of the country, let alone to the competitive global economy". Despite the importance attached to knowledge resources globally for the development of the modern economy, study shows that economies that lag behind are characterised relatively by low capacity of knowledge generation and wise use of economically relevant knowledge (Adeoti, 2009: 375). This mainly emanates from a low understanding of the importance of

university-industry linkage among academics and policy makers (D'Este & Patel, 2007: 1296).

The problem occurs in Ethiopian too. As Galawudos (2011: 3) states, "unless Ethiopia experience a massive overhaul of its economy and heads towards a manufacturing industry, it would be almost impossible to secure jobs for thousands of college graduates". Saint (2004: 94) also argued that the Ethiopian labour-market is limited to university graduates. This implies that there is a problem of managing the linkage between the universities and industries. Moreover, the Ethiopian MoE in its education sector development programme four (ESDP-IV) report indicated that the lack of strong technology transfer system as the major problem between universities and industries (MOE, 2010b: 64). However, research suggests that university-industry linkage as a panacea to graduate unemployment and means to increase innovation and international competitiveness (Joshua, Azuh & Olanrewaju, 2015: 17).

Currently, with the expansion of universities in Ethiopia, many graduates are unable to find equitable and relevant employment opportunities in their area of study. The government is advocating for the creation of their own jobs, whereas the graduates question the availability of employment opportunities that are triggered by the poor economic environment of the country. The employment strategy clearly states that the public sector cannot be the biggest employer anymore (FDRE, 2009b: 9). The civil service has to absorb and employ highly skilled and well-paid civil servants to ensure its leading and facilitating role for a thriving private sector. This becomes the issue of public debate through different mass media, newspapers and other related forums, which triggered this study to be conducted.

Cognisant of these debates as well as the intensity of the problems in the bigger picture, this study attempts to examine how university-industry linkage can be effectively managed in the government universities of Ethiopia in order to promote development in the country. To this end, this study attempts to answer the overarching research question, "***How can the linkage between universities and industries be effectively managed to produce qualified manpower for the economic development of Ethiopia?"***

Globally, it is widely recognised that promoting university-industry linkage (UIL) forms part of the economic development and a means to enhance international competitiveness. In relation to this, the above research question is further broken down into the following sub-questions.

The first sub-question considers a global and contextual review of the related literature that frames the study. Relevant theories, models and concepts in relation to the study context will be discussed. Hence, the first question can be stated as follows:

1. ***What is known about university-industry linkage (UIL) globally? What theories, models and concepts are underlying UIL in relation to the study contexts?***

These sub-questions are addressed theoretically in chapters two and three. The second basic question is related to the status of management of UIL in government universities of Ethiopia. It tries to examine from four management functions like planning, organising, staffing and decision-making (Kimani, 2007: 17). Moreover, it tries to explore the areas of linkage and benefits obtained from the linkages. Chapter 5 and 6 dwell on this issue. Consequently, the following question emerged:

2. ***What is the level of management of university-industry linkage in government universities of Ethiopia in terms of planning, organising, staffing and decision-making? What are the major areas of linkage? What benefits are obtained so far from the linkage?***

Thirdly, to make inferences from the views of university managers (Department heads and college/school/faculty/institute deans), university instructors and prospective graduates both t-test and ANoVA were employed to see the existence of perception differences. In addition to this, a *Scheffe test of post hoc* analysis for unequal sample size was conducted, and the result was discussed. This basic question was addressed in chapter 5 in the quantitative section. It was stated as:

3. ***Is there a difference in perception among university managers, instructors and students in relation to the management of UIL in government universities of Ethiopia?***

The fourth issue that warrants special attention is the challenges that hindered the strengthening of UIL in government universities of Ethiopia on one hand and the available opportunities that could be employed on the other. This was also addressed in Chapter 5, and the basic question reads:

4. ***What are the challenges that hinder the promotion of UIL in government universities of Ethiopia? What opportunities are in place to strengthen UIL?***

The final sub-question designed for this study was improving the practice of UIL in government universities of Ethiopia. In relation to this, it investigates the strategies that may strengthen UIL. Moreover, it came up with the model that will improve the practice of UIL in relation to the study context. Consequently, the question is reframed as:

5. ***How can the practice of management of UIL in government universities of Ethiopia be improved? What appropriate model can be developed to improve the practices?***

This main research question is discussed in chapter 5 and 6.

1.4 AIM AND OBJECTIVES OF THE STUDY

The aim of this research is to examine the way in which the linkage between universities and industries can effectively be managed to produce qualified manpower that the economy demands. To achieve this aim, the following specific objectives were expected to be met at the end of this research:

i. To identify the level of management of university-industry linkage in government universities of Ethiopia in terms of planning, organising, staffing and decision-making.

ii. To identify what is known about UIL globally and its underlying theories from the literature.

iii. To pinpoint the areas of university-industry linkage in the government universities of Ethiopia.

iv. To explore the benefits obtained so far as a result of the linkage.

v. To determine whether there exists differences in perception among the three groups of respondents (University managers, instructors and students) in managing UIL.

vi. To identify major challenges that hindered the effective implementation of UIL activities in government universities of Ethiopia.

vii. To suggest some feasible alternative strategies to promote the linkage between universities and industries so as to bring development in the country.

viii. To develop a model that may assist to improve the practice of UIL in government universities of Ethiopia.

1.5 MOTIVATION FOR THE RESEARCH

Universities are no longer confined to their traditional roles of knowledge production (Hamdan*, et al.,* 2011: 785). Rather, they are positioned as strategic assets in innovation and economic competitiveness, and as problem-solvers for socio-economic issues affecting their countries (Ssebuwufu*, et al.*, 2012: 7). With this premises, developing countries like Ethiopia will enhance its development efforts, if and only if, they use their educated manpower as effectively as possible. The symbiotic relationship between the university and industry are very significant because these two sectors can foster economic development of the country (Hamdan, *et al.,* 2011: 785). In contrast, idle graduates without jobs are a waste for the family as well as the country in general, as the allocated resources are not efficiently used. In addition to this, it could be a breeding ground for political, social and economic instability in the country. Educational leaders are expected to play a major role in strengthening UIL. In line with this, Ssebuwufu, *et al.,* (2012: 8) state that the effectiveness of leadership in terms of policy implementation and personnel management was noted as an important enabling factor for promoting UIL. This study, focused as it is on the management of UIL, is, therefore, both timely and significant, as it addresses both the

challenges of managing UIL and suggests ways of overcoming these challenges.

To this end, conducting research on the management of UIL has economic, social, policy, theoretical, practical and academic significances. To begin with, UIL strives to produce market-driven quality graduates who can contribute to the economic development of the country. Moreover, a strong synergy between industries and universities can increase international competitiveness through research, innovation and technology transfer. This could contribute conceivably to the economic development of the country.

Socially, UIL creates a knowledgeable graduate who actively participates in different problem-solving activities within society through research, innovation and technology transfer. Skilled and competent manpower can be the foundation for social stability as they get the opportunity to create their own jobs and can also easily join the labourmarket.

Thirdly, this study has policy implications for decision-makers placed at different organisational hierarchies. It tries to see the practicability of UIL related policies at the grass-root level. This will explore and describe the challenges and opportunities of implementing UIL policies and guidelines currently in place and will suggest ways for further refinement and restructuring.

Lastly, this study has both theoretical and academic significance as it adds value to the existing body of knowledge. It may also serve as the base for further study to be conducted in relation to UIL.

1.6 THESIS STATEMENT

This study was nested in the following four major knowledge claims from the discussion made so far in the background, problem statement, basic questions and objectives set.

i. It claims that UIL in government universities of Ethiopia lacks proper management. It assumes that there is no joint planning, organising

resources, staffing and decision-making activities on the issues of UIL. It further argues that the need for partnership is dominated by the universities while industries do not value the importance of such partnerships. Consequently, the claim further goes on that the desired result was not achieved.

ii. UIL is viewed as the means to leverage the economic development of a nation through innovation and technology transfer (Ahmed & Jumani, 2013: 209; Adeoti, 2009: 375; Guimon, 2013: 1; Siyanbola, Oladipo, Oyewale, Famurewa & Ogundari, 2012: 280). It is a means to increase international competitiveness and often cited as the panacea to reduce unemployment and underemployment. However, this study claims that as the linkage between universities and the industries in Ethiopia is not strong enough, UIL does not contribute significantly to the economic development of the country.

iii. This study claims that national concerns and priorities (TGE, 1994a: 359; TGE, 1994b: 25; FDRE, 2003: 2237; FDRE, 2009: 4991; FDRE, 2015: 8614) in relation to UIL are not adequately addressed through current policies and strategies. This study further explains that what is indicated at the national level is not properly implemented in practice, creating a huge rift between the plan and actual practice.

iv. This study also claims that Ethiopian government universities are not contributing to the development of the country to their maximum capacity as they are overburdened with their traditional teaching roles (Guimon, 2013: 2) leaving many unemployed university graduates on the street. This study, therefore, claims that Ethiopian government universities are islands alienated from the labourmarket, and consequently are producing fewer quality graduates for the economy. Based on the above chain of claims, the thesis statement for this study is:

"UIL in government universities of Ethiopia is not properly managed, therefore, does not contribute to the overall development of the country

to its maximum capacity; consequently, the management of UIL requires more practical action and less rhetoric to bring real change."

1.7 DEMARCATION OF THE STUDY

This study was theoretically delimited to UIL in terms of the level of management, areas of UIL, benefits of UIL, challenges and opportunities of UIL framed with Triple Helix model, human capital and systems theory viewpoints. Moreover, it is limited to the government universities of Ethiopia. Specifically, first and second generation universities were included in the study as the third generation universities are young and not yet capable of graduating students, especially in the fields of Engineering and Technology, at the time of data collection for this study. Private universities were not part of this study as they are at an early stage of development and limited in number within the country. The study also only considered undergraduate first-degree students with the focus on Engineering and Technology, and Business and Economics colleges as a sample.

1.8 THEORETICAL FRAMEWORK

This study was viewed from the perspectives of systems theory as a unifying theoretical framework (Chen & Stroup, 1993: 447) that links educational organisations to the external environment (like industries) and the human capital theory (Olaniyan & Okemakinde, 2008; 157; McNamara, 2012: 2) as one major mission of educational organisations (in this case universities) in producing competent and quality graduates for the labourmarket. In addition to these theories, Triple Helix model was also employed to investigate the relationship between the government, universities and industries as the major role players in the helixes (Ranga & Etzkowitz, 2013: 238; Etzkowitz, 2008: 9).

To begin with system theory, educational institutions are not separately treated from the environment in which they are operating. Taking various inputs from its environments, processing these inputs (in these case students) in some way and producing outputs from the system is the idea of systems theory in this regard (Mizikaci, 2006: 41). In this complex process, different components interact to bring

about the desired outputs, finally, outcomes. As stated by Chen and Stroup (1993: 447) the multidisciplinary nature of systems theory, the ability to engage complexity, the ability to describe system dynamics and change, the ability to represent relationship between the micro-level and macro-level of analysis and the ability to bring together the natural and human world is applicable to this study.

The effect of systems theory in educational organisations is that the managers, writers, educators, consultants and so on are helping managers to look at organisations from a broader perspective (McNamara, 2012: 2). Systems theory has brought a new perspective for educational managers to interpret patterns and events in the organisations.

Secondly, the justification behind the use of human capital theory in this study is with the assumption that formal education is highly instrumental and even necessary to improve the production capacity of a population (Olaniyan & Okemakinde, 2008: 157). This idea was advocated by the early human capital theorists like Schultz (1971), Sakamota and Powers (1995), Psacharopoulos and Woodhall (1997). In this regard, the theoretical framework most responsible for the wholesome adoption of education and development policies has come to be known as human capital theory (Olaniyan & Okemakinde, 2008: 158). As a means to build human capital, universities are expected to train qualified manpower that the economy demands. Studies conducted in different parts of the world indicate that there is a positive correlation between the economic development of the country and the educational attainment of the citizens (Olaniyan & Okemakinde, 2008: 159; Marotta, Mark, Blom & Thorn, 2003: 2). This correlation is mainly attributed to education and training obtained from educational institutions.

The underlying assumption that human capital theory, which is the stock ofcompetencies, knowledge, social and personality attributes, including creativity, embodied in the ability to perform labourto produce economic value (Marotta*, et al.,* 2003: 2) is quite sound for this study. Hence, education as an engine to economic growth rests on the quality and quantity of education in the country (Olaniyan & Okemakinde, 2008: 157). For education to contribute significantly to economic growth and development, it must be high quality to meet the skill needs of the economy.

Therefore, the contribution of universities to economic development by building human capital is highly valuable which in turn calls for proper management.

Lastly, the Triple Helix model is also used as means of analysing university-industry linkage (Leydesdorff & Meyer, 2006: 13; Ranga & Etzkowitz, 2013: 238; Etzkowitz, 2008: 9). The Triple Helix model denotes the university-industry-government relationships as one of the relatively equal yet interdependent institutional spheres, which overlap and take the role of others (Etzkowitz, 2011: 2). The model states the role played by the government, universities and industries, which can be observed from different angles. In relation to this, Etzkowitz, Dzisah, Ranga and Zhou (2007: 15) argued that the concept comprises three elements:

i. an enhanced role of universities in innovation with the government and industries in knowledge-based society.
ii. a strong move toward more collaborative interaction among the three role-players, in which innovation is strongly the result of the outcome of genuine interaction among the partners than the prescription of the government.
iii. Potential sources of innovation are obtained from institutions playing their non-traditional roles.

Moreover, Etzkowitz (2002: 2) explains that the first dimension of the Triple Helix model is the internal transformation in each of the helices, such as the development of lateral ties among industries through strategic allies or an assumption of an economic development mission by the universities. This emphasises the role of universities in satisfying the market demands.

University-industry linkage is strongly suggested in increasing international competitiveness through research, innovation and technology transfer. Despite this, there is an intense scholarly policy debate on the need for the creation of a strong relationship between university and industry in the literature. Those who contend the necessity of university-industry linkage raises their concern about the costs and time consumption that may be detrimental to university research (Giuliani & Areza, 2008: 3). The proponents of this group argue that it undermines researcher's intellectual freedom, in both the definition of their research agenda and in the way the results of

research are used as public.

Contrary to this, scholars who promote the idea that university should go beyond their traditional teaching and research activities, and undertake a 'third mission', aimed at more direct interaction and contribution to the industry (Giuliani & Areza, 2008: 3). In supporting and strengthening this idea, this study tries to investigate the management of university-industry linkage from its positive aspects.

In summary, universities are established to serve the society, which shows their strong tie with the external environment. This can be understood from a system theory perspective. Moreover, universities are the centre for producing competent, skilled and knowledgeable personnel that make efficient use of technology in the era of competition. This again brings the notion of human capital theory. Finally, Triple helix model, which shows the interdependency of university-industry-government, is important in analysing this relation. In relation to these theories and model, relevant research design and its philosophical underpinnings are discussed in the subsequent sections.

1.9 RESEARCH DESIGN

1.9.1 Research paradigm, ontological and epistemological assumptions

Philosophically, this research adopted the pragmatism research paradigm as it underpins mixed research approach. Ontology (view of how one perceives reality), is the base for the development of theoretical and conceptual framework (Cumming, 2012: 4; Denzin, 2010: 419). Consequently, university-industry linkage was seen from the systems theory viewpoint and human capital theory perspective. Moreover, the Triple Helix model was used to see the interaction among three parties-the government, universities and the industries. Reality was also perceived as the interaction of the internal and external world rather than considering them as independent entities. Epistemologically (how we come to know) (Scotland, 2012: 1), it followed the eclectic method of inquiry in which the combination of inductive and deductive ways of obtaining knowledge was assumed to produce better results.

As stated by Creswell (2007: 10) it is also 'practical' because individuals tend to solve problems using both numbers and words, they combine inductive and deductive thinking and employ skills in absorbing people as well as recording behaviour. Hence, as indicated by Angell and Townsend (2011: 9) the appropriate philosophical underpinnings for the mixed approach is pragmatism using both deductive and inductive reasoning. "….Pragmatism as worldview arises out of actions, situations, and consequences rather than antecedent conditions (as in positivism)" (Creswell, 2008: 43). The basic concept of this approach is that the integration of qualitative and quantitative data maximises the strengths and minimises the weaknesses of each type of data. These data are obtained through questionnaires and interviews (Detail discussion is made in section 4.3.1).

1.9.2. Research approach

In this study, a mixed research approach was used. It is a method employing rigorous quantitative research assessing magnitude and frequency of constructs and rigorous qualitative research exploring the meaning and understanding of constructs (Creswell, Klassen, Clark & Smith, 2012: 4). The underlying philosophical position of this method is to bridge the positivist and social constructivist worldviews through pragmatic perspectives and transformative strengths of each to answer research questions (Creswell*, et al.,* 2012: 5).

More specifically, to know the level of management of university-industry linkage in government universities of Ethiopia, a convergent/parallel/concurrent design was used. In this design, quantitative and qualitative strands are conducted separately yet concurrently and merged at the point of interpretation (Angell & Townsend, 2011: 9). They further explained that it is used to form a complete understanding of a topic or to validate or corroborate quantitative scales. It has two separate phases:

Phase1. Of the mixed approach, both quantitative and qualitative data are collected concurrently from the field.

Phase2. In the interpretation or discussion, both the collected data (qualitative and quantitative) are merged together (Creswell, 2012: 541 & Refer Figure 4.1).

The veteran writer in the area of mixed research design, Creswell (2009: 213) states that in the concurrent triangulation approach the researcher collects both quantitative and qualitative data concurrently and then compares the two databases to determineif there is convergence, difference, or some combinations. Hence, the study of the management of university-industry linkage could be conducted in these two specificphasestoaddress the basic questions adequately (detail discussion was done in section 4.3.4.1).

1.9.3. Data sources

Identifying appropriate data sources determines the credibility of the research results. To this end, primary and secondary sources of data were considered for this study.

Primary data sources: were university/college/school/faculty/institute deans, department heads, instructors and prospective graduates. Moreover, UILO heads, industry representatives, directors from MoE and MoST were approached for interviews. University alumni were also another data sources and addressed through Focus Group Interview/ Discussion (FGI/D).

Secondary data sources: documents like policies, guidelines, directives, and educational statistical abstracts from MoE, MoST and different government proclamations were used as data sources. They were used to substantiate the primary sources of data indicated above.

1.9.4. Population and sampling

The population of this study were government universities, management bodies, academic staff, students, graduates and industries found in the country. Government universities became the site of this research due to the fact that private universities are fee-charging institutions so that students join on the basis of their best interest and market gaps. However, this is limited in the cases of government universities.

At the time of data collection for this study, there were 31 government universities, though its number currently stands at 44 including two civil service universities, and

eleven universities opened recently in different parts of the country. From these 31 universities, third generation universities (Wolkitie, Wachamo, Woldia, Mettu, Debre Tabor, Bule Hora, Adigrat, Assosa, and Addis Ababa science and technology universities) were purposefully excluded from the sample as they are at their early stage of development in terms of infrastructure, academic staffs, laboratories and other concepts related to UIL. They are not yet operating at their full capacity. Therefore, they were purposely excluded from the sample as they may distort the overall results of the study. In contrast, the remaining universities are better equipped with resources and are accredited to provide postgraduate programmes so as to meet the manpower demands of these new universities and the labourmarket in general. Consequently, they were included in the sample.

The first-generation universities are relatively experienced compared to others. From the 22 first and second-generation universities, eight were excluded from the sample as they did not start graduating students in the area of Engineering and Technology until the end of 2014. As a result, from 14 experienced government universities found in the country, seven of them (50%) were included in the sample using simple random sampling, specifically the lottery method (Creswell, 2007: 185; Singh, 2007: 166 & also refer to Table 4.1). The application of this method is justified on the basis that it gives an equal chance for the population to be selected as a sample and avoids bias (Creswell, 2007: 185; Gomm, 2008: 138; Singh, 2007: 166). Accordingly, Mekelle, Bahirdar, Adama, Haramaya and Hawassa universities were included in the sample from the first category while Dire Dawa and Wollega universities from the second-generation. The selection was made after merging the two categories. Following this, each of the sample universities was divided into faculties/schools of which one faculty from hard sciences (Engineering and Technology) and one from social sciences(Business and Economics) were included in the sample by considering the 70:30 government strategy (MoE, 2010b: 9; FDRE, 2016: 50). The 70:30 proportion refers to the governments' strategy to enrol70 percent in science and technology fields (hard sciences) and 30 percent in social sciences (soft sciences).

From these identified faculties/schools, one programme/department from each of the schools was selected using simple random sampling (Creswell, 2012: 143) because of the above-mentioned justifications. Prospective graduates from each department

were selected from the rest purposefully (Creswell, 2012: 45) because of their exposure to the field of work through different practical courses during their graduation year. Largely they were assumed to join the field of work after graduation and better know the experiences of their universities in creating a partnership with the industries (Detailed procedure of population and sampling is presented in section 4.4 of the fourth chapter).

1.9.5. Instrumentation and data collection techniques

Instruments of data collection for this study was used in line with the problem statements, basic questions and study design indicated earlier. As a result, questionnaires, individual interviews, focus group interviews/discussions and document reviews were used as data gathering instruments. Briefly, each of the instruments is presented here under, where the detail discussion of the instruments is included in chapter four.

1.9.5.1. Questionnaire

In this study, questionnaires were used as data gathering instruments as it enables to get wider information from the widely dispersed sample population. It also makes possible an economy of time and expense and provides a high proportion of usable responses (Best & Khan 2003: 301; Creswell, 2009: 145; Cohen, *et al.*, 2007: 317). Moreover, he study aimed to obtain unbiased, factual data, opinions and attitudes in the structural framework from respondents.

In relation to this study, questionnaires had both closed and open-ended questions for three groups of the respondents: students, academic staffs and management bodies (College/school/faculty deans and department heads) (Appendix G, F &E respectively). Specific questions related to the responsibilities of the respondents were included in each group. There were also some common questions for three groups of respondents to compare their views on the issue. Administrative staffs were deliberately excluded from the research because they are not directly concerned with managing university-industry linkages (UIL). Open-ended questions were justified because they call for free responses in the respondents own words (Best & Khan,

2003:301). Despite this, since it is difficult to address the number of graduates/alumni through questionnaires in the area of work, they were included in focus group interviews to corroborate and triangulate their views in this research (detail presentation is presented in section 4.4.1.1.).

1.9.5.2. Interviews

As the second major data gathering instrument, semi-structured interview questions were prepared for university management bodies that have a direct relation to the activities of UIL (Appendix H,I,J and K). Accordingly, UIL office heads, high-level directors from the ministry of education (MOE) and Ministry of Science and Technology (MoST) who were directly concerned with the issue participated in the interview. This is due to their direct exposure to the stakeholders. *Tailor-made* semi-structured interview-protocols were prepared for each of the study participants as per their contexts. The major advantage behind this instrument is that it allows greater flexibility for the interviewer and the interviewee, and a better chance to explain more explicitly what he/she feels on the issue (Best & Khan, 2003: 323; Cohen, *et al.,* 2007: 349). It is the collection of detail information on the management of the linkage between universities and industries. Six semi-structured interview questions for UILO office heads and industry representatives were prepared and conducted with them at their most convenient time (Appendix H & I). Similarly, eight semi-structured interview questions were prepared for MoE, and MoST directors and interviews were held with them as per their schedule (Appendix J & K). This was applied until information was saturated and believed to be sufficient for the study (Creswell, 2012: 628). Interviewswere conducted by the researcher supported by electronic devices to record their voices and watch body movements for later transcription and interpretation. In addition, field notes were taken during interviews to remember the incidents as they occurred.

1.9.5.3 Focus group interview (FGI)

A focus group interview as the third technique was conducted with the university graduates/alumni. Semi-structured focus group interview-guide was prepared for the alumni in relation to their experience both as a university graduate and as the field worker in the industries. Seven questions related to the basic questions were prepared for the guide. Interviews were conducted with the respondents for amaximum of one and half hours (Appendix L). The number of participants in each group was six. Data collection was supported by audio-recording to transcribe and interpret the results of the interview properly. Focus group interview highly values the information obtained from the interaction as the cumulative effect of individuals' idea will have a positive impact on the reliability of the data obtained.

1.9.5.4. Document reviews

Different Ethiopian government proclamations in relation to UIL like university proclamations, science and technology policies and directives were employed as data sources. In addition to this, policies, strategies and reports of the government like Education and Training Policy (ETP), ESDPs, GTP I & II, and different annual statistical abstracts of MoE were also used as data sources for comparison and analysis.

1.10. METHOD OF DATA ANALYSIS AND INTERPRETATION

Data collected through questionnaires were analysed using both descriptive (section 5.2) and inferential statistics. Both descriptive statistics like grand mean and independent t-test were used (section 5.3.1.1.1.). Further, to identify the major areas of UIL and its benefits, one-way analysis of variance (ANoVA) was used to see the existence perception differences among students, instructors and university management bodies to identify the level of management of UIL(sections 5.3.2; 5.3.3.;5.3.5 and 5.3.6). Factor analysis, specifically, Principal Component Analysis (PCA) was also used to identify the latent variable/s that has/have a greater impact on the proper implementation of UIL in government universities of Ethiopia (section 5.3.4). The data were computed using statistical package for social sciences (SPSS) version

23. Finally, the proposed basic questions were addressed through rigorous quantitative analysis.

Qualitative data obtained through interviews and focus group interview were audio-recorded and carefully transcribed and analysed as the means to triangulate the data obtained from the questionnaire. These data were interpreted by categorising into themes and categories (Creswell, 2012: 261-262). Six themes and 24 categories were outlined in the interviews, and the results were presented in chapter five (Refer to section 5.4.2). The conglomerate effects of these tools were expected to increase the advantages of mixed approach (for details, refer to section 4.5).

1.11. RELIABILITY AND VALIDITY OF RESEARCH

Tests of reliability and validity of instruments depend upon the chosen approach. In this case, the mixed methods approach dictates the application of the test. Accordingly, before administering the instruments of data collection, it was essential to standardise the tools as it gives first chance to comment on and check its clarity. A pilot study was conducted at Dilla University, which was not the part of the sample universities to check the validity and reliability of the instruments on 25 students (15 from Engineering and Technology and 10 from College of Business and Economics) and 10 instructors, 7 (seven) department heads and 5 (five) college deans. The proportion was purposefully selected to reflect the proportion of the sample.

Finally, reliability (equivalence, consistency and stability) and validity (face, content, criterion and construct) were tested using Cronbach's alpha method (Creswell, 2012: 619 & 622). Reliability was calculated using Cronbach's alpha which is more applicable to questionnaires of Likert scale type (Wiersma & Jurs, 2009: 356). Its result ranges from 0 to 1 implying the higher alpha level shows greater reliability (section 4.6.1). In general, to maintain the validity and reliability of this research, pilot testing, triangulation, member-checking and external-auditing techniques were employed. After several adjustments, the questionnaire, interview and FGD guide were used as a data gathering instruments (For more refer to section 4.6).

1.12. RESEARCH ETHICS

Research is a public trust that must be ethically conducted, trustworthy, and socially responsible if the results are to be valuable (University of Minnesota, 2003: 6). Accordingly, before gathering information from the respondents, the aims and the objectives of the study were explained to respondents, and full consent of the informants was obtained. In relation to this, Creswell (2012: 149) states that "the researcher develops an informed consent form for the applicant to sign before they engage in the research." It is also explained from the outset that the information collected was only used for academic purposes. They were also allowed to withdraw at any stage when they feel uncomfortable with the issue (Creswell, 2008: 89; *Cohen, et al.,* 2007: 382; Jordan, 2013: 254; Egan, Stockley, Lam, Kinderman & Youmans, 2016: 6). Interview participants were also involved based on their full consent by filling protocol for their willingness to be asked and recorded during the interview (Creswell, 2009: 183). Their full right to self-determination (Cohen, *et al.,* 2007: 52; Egan, *et al*., 2016: 6) and to withdraw at any stage of the interview, was also respected. Moreover, private issues, which were unethical and culturally considered taboo, were avoided from the questionnaires. The anonymity of the respondents' responses was maintained (see also Appendix D-N).

As far as the ethical consideration was concerned, the issue of proper acknowledgement of the sources of literature is worth mentioning. Hence, all the sources (books, journals, periodicals and world website sources) used in this study were acknowledged both in the text as well as in the reference part. In addition, the detail discussion is presented on issues related to research ethics like informed consent, anonymity and confidentiality, voluntarism, risk-free interaction, and honesty and transparency in sections from 4.7.1- 4.7.5. As permission, ethical clearance letter was obtained from the University of South Africa, and a support letter was obtained from Dilla University to different universities, industries and other related government organisations considered in the sample (Appendix B, C &D).

1.13 DEFINITION OF TERMS

Providing operational definitions to the concepts used in this research is important as

they may lead to different interpretations. Accordingly, the following major concepts are treated under the following sub-headings.

1.13.1. Government institution

In accordance with article 55(1) of the constitution of the federal democratic republic of Ethiopia (FDRE, 2003b: 2236; FDRE, 2009a: 4978), proclamation No.351/2003 and Proclamation No. 650/2009:

"*Government/public institution"* means a university, university-college, college or institution offering higher education with the budget allocated by the federal or regional governments, as the case may be. These universities were established with the government proclamations at different times and funded by the federal government. The central government is generally responsible for setting policies, guidelines, standardising curriculum, and monitoring and evaluation of the overall performances of these universities. Specifically, the Ethiopian MoE is in charge of supporting, guiding and controlling the activities of these universities. In this study, the focus is on the government or public universities. The terms public and government are used interchangeably in Ethiopian case, though, they may have different meanings in other parts of the world.

1.13.2. Higher institutions

Higher Institutions means education and training programmes as given to students who have successfully completed post-secondary education (FDRE, 2003b: 2235). It is education and training offered both for undergraduate and postgraduate students (FDRE, 2009a: 4977). As per this explanation, higher education institutions may include regional teachers' training colleges, Agricultural colleges, research institutes, numerous private colleges and universities, TVETs and so on. They vary in the kinds of programmes they offer, management and focus. Some of them are responsible to the regional governments, while others are managed privately. In the case of this study, it applies to undergraduate degree programmes offered in government universities in regular programmes alone. Moreover, the term higher institutions and higher education institutions are used interchangeably.

1.13.3. University

Higher education proclamation No 351/2003 and the revised proclamation No 650/2009 states the university as institutions offering different undergraduate and postgraduate programmes. It states that the ministry shall guarantee the name university when the institution has an enrolment capacity of at least 2000 students both in undergraduate and postgraduate programmes in at least three academic units larger than departments and a record of at least four class graduates in degree programmes. Further, it has to conduct research in appropriate fields and design relevant curriculum that meets the national standards set by the ministry (FDRE, 2009a: 4983; FDRE, 2003: 2239). Although this definition applies to both government and private universities, this concept only applies to government universities found in the country as per this study.

Universities are also defined as multi-purpose organisations that undertake teaching and research but also provide a public services (mainly working for the good of the community) (Mattheou & Saiti, 2005: 1). In this regard, universities are established for various purposes of which solving societal problems through research and producing competent manpower that the market demands are the major ones. Hence, the terms university and higher institutions are used interchangeably in this study.

1.13.4. Industry

The word industry originally came from the Latin word ‘industria’ that denotes diligence (Encarta, 2010). Kannan (2012: 53) defined industry as various enterprises, organisations and institutions, which may carryout transactions with or provide services to its customers. It may also categorise into small, medium and large scale based on the amount of their investment, human power, geographical distribution and intensity of technological usage.

In some cases, industries can also be viewed from the perspective of processing primary products to semi-processed or processed products. This actually ignores the service sectors. Despite this, many people think of industry as the collective large-scale manufacturing of goods in well-organised plants with a high degree of

automation and specialisation alone. Although this is a common example of industry, it can also include other commercial activities that provide goods and services such as agriculture, transportation, hospitality, and many others. For the purpose of this study, the industry is mainly operationalised interms of construction, manufacturing and service industries.

1.13.5. Management

Management is the process of planning, organising, directing, controlling and evaluating to accomplish predetermined objectives of an institution through the coordinated use of human and material resources (Busher, 2006: 5; Carpenter, Bauer & Erdogan, 2012: 11). Moreover, Management is the process of working with and through groups or individuals to accomplish organisational goals (Kimani, 2007: 17; Carpenter, *et al.,* 2012: 11). In this regard, the term refers to the way the universities work jointly in technology transfer, research and manpower exchange with the industry through planning, organising, staffing and joint decision-making. The other definition given to management applied for this study is, it is the process of varying methodologies applied at different levels within a well-structured organisation, accompanied by a principle of effective integration which allows that the organisation to successfully adapt to a changing environment (Mattheou & Saiti, 2005: 1).

1.13.6. University-industry linkage (UIL)

Also called university-industry partnership (Abdu, 2013: 20; Tumuti, Wanderi, & Thoruwa, 2013: 16) refers to the symbiotic relationship that exists between the university and industry with the support and facilitation of the government in the areas of research, consultancy services, students' practical attachment, innovation, technology transfer and resource sharing so as to promote their common goals in particular and the country at large (Vielba & Esquinas, 2011: 240; Ssebuwufu, *et* al., 2012: 11; Derbew, Mungamura, Asnake, 2015: 73; Abraham, 2016: 2). In the context of this study, university-industry linkage/partnership/collaboration/interactions are used interchangeably.

1.13.7. Linkage

Merriam-Webster dictionary (2016) defines the word “linkage” as a connection or relationship between two or more things. It also defines as a part that connects two or more cases. In this case, it refers to a co-ordinated system of work among education and training, research institutions and industries to engage in a collaborative manner (MoST, 2013: 8). Moreover, it is creating partnership/ collaboration between universities and the industries, to obtain more resources, produce high-quality researches, ensuring that the graduates have the required skills, and increase innovation and technology transfer activities (Ssebuwufu, *et* al., 2012: 8). Similarly, linkage in the context of this study shows the partnership or lateral ties between Ethiopian government universities and industries.

1.14. CHAPTER OUTLINES

This study was framed into six chapters. The first chapter was about the general orientation of the research. It contained the background of the study, problem statement, aim and objectives of the study, thesis statement, and delimitation of the study. In addition, a brief description of the theoretical framework, research design and methodology, method of data analysis and interpretation, reliability and validity issues were included. Finally, research ethics, the operational definition of terms and chapter outlines were the parts of this chapter.

The second chapter reviewed the differentliterature about the management of university-industry linkage from global perspectives. This part was supported and enriched by the theoretical framework of the study. Systems theory, human capital theory and Triple Helix models were used to frame the study; consequently, discussed in detail in relation to the study contexts. The chapter concludes with the drawing of conceptual framework and conclusion of the chapter.

The third chapter was the continuation of the second chapter by taking the management of university-industry linkage to the Ethiopian contexts. In this section, concepts and rationale for UIL, its historical developments, experiences of developed and developing countries, problems related to UIL in the African continent, benefits of

UIL and the study contexts were included.

The fourth chapter of the thesis was about the research paradigm, design and methodology. It started with the explanation of the mixed research design and its philosophical underpinnings. Separate sections were given, and each of them was adequately discussed. This chapter also included population and sampling techniques, methods of data analysis and interpretation, validity and reliability of research. In addition, detail discussions on issues related to research ethics like informed consent, anonymity and confidentiality, voluntarism, risk-free interaction, honesty and transparency were made.

The fifth chapter provides the analysis and interpretation of the data obtained from the respondents and document analysis. In line with the study design, the first section presented the quantitative data results while the second showed the result of the qualitative data. The third section included the interpretation of the integrated data. Finally, the chapter culminated with the development of a model to improve the practice of management of UIL in government universities of Ethiopia.

The final part of the thesis summarised and concluded the findings of the study in relation to the initial basic questions. Specifically, a summary of literature research (chapter 2, 3 and 4) and empirical investigation (chapter 5) was given separate sections in line with the research questions. Key findings of the study were also part of the chapter. Further, recommendation for the improvements of practices, areas of further research, limitation to the study and concluding remarks were included in this chapter. As appendices, all other related materials like data gathering instruments, sample consent formant of the respondents and references were attached at the end of the report.

1.15. CONCLUSION

The merits of university-industry linkage cannot be overemphasised. Today's technological society demands much from the university-industry partnership (Ssebuwufu, *et al.,* 2012:9; Hamdan, *et al.,* 2011: 785; Kannan, 2012: 50). Research universities were not only committed to bringing research to the centre of academic

enterprise but also to linking research to applied science and national development (Altbach, 2011: 8). In this endeavour, educational managers are expected to be a catalyst in forging and strengthening this relationship. In line with this basic assumption, the problem statement, and aim and objectives of the study were set. In its statement of the problem, it tried to reveal the knowledge gap observed in strengthening the linkages. The study designed mixed approach using pragmatic paradigm.

The underlining theoretical frameworks employed were both the system theory viewpoints, which trace organisations from its entirety and the human capital theory, which explains the role of training and development in addressing the development needs of the nations. The study further explains the linkage of university and industry using Triple Helix model so as to strengthen the linkage among three parties-government, university and the industry, whereas educational managers are expected to play leading role in this regard. Questionnaires, interviews, focus group interviews and document reviews were used as data gathering instruments. Finally, methodof data analysis, the definition of concepts and chapter outlines were indicated in this chapter.

CHAPTER TWO
THEORETICAL AND CONCEPTUAL FRAMEWORK

2.1. INTRODUCTION

In the process of social inquiry and knowledge building, theories are the respected maps (Akinyem & Abiddin, 2013: 150) that guide the whole research activity. The underlying assumptions, explanations, principles and methods could be framed with the help of theories. In addition to this, it offers a general framework for analysis, efficient strategies for field development and provides a description of the pragmatic world (Wacker, 1998: 162). Hence, it seems quite relevant to discuss the underlying concepts and theories before directly get into the main body of the study.

In studying university-industry linkage, different interacting variables will be discussed using system theory perspectives. This theory assumes that 'the whole is greater than the sum of its parts' (Johnson, 2001: 135; Hansen, 1995: 9; Barker, Sturdivant & Smith, 2000: 4; Mizikaci, 2006: 43; Betts, 2003: 38). This implies the interaction among the inputs to the system, the process and the interaction among the parts will have an impact on the outputs to be produced (in this case quality graduates produced) from the universities.

In addition to this, the roles of universities in producing competent and skilled workforces that enhance the economic, social, cultural, political and technological advancement of the country are viewed from the human capital theory perspective. This theory views education as the major instrument to build human capital (Kwon, 2009: 2; Loomis & Rodriguez, 2009: 509; Akinyemi & Abiddin, 2013: 150). Moreover, governments' investment in education as a means of capacity building is also considered. As a result, the three parties- government, industry and university are expected to play an unparalleled role in an integrated and co-operative manner for their mutual benefit to bring about the desired results. In explaining the interaction between the three parties, the 'Triple Helix' model is widely used in the literature. Similarly, this study tries to see the linkage from this perspective too. In general, this chapter dwells on the global aspects of university-industry linkage, analysis of systems theory and human capital theory viewpoints using the Triple Helix model.

2.2. UNIVERSITY-INDUSTRY LINKAGE: THE GLOBAL PERSPECTIVE

The issue of university-industry linkage has received global attention with the increasing roles of universities and ever-growing market competition and rapid technological advancement. In support of this, Burnside, Beth and Witkin (2008: 26) state that collaboration is highly valued in the era of globalisation where there is also a growing need for an international market network, and increasing demand for research and development than ever. This implies the quest for strong linkage to remain competitive in the global world.

Likewise, Hamdan, Yusof, Omar, Abdullah, Nasrudin and Abullah (2011: 785) emphasise that, in the context of globalisation and competitiveness, the roles and expectations of universities are becoming more complex. The university should not limit itself anymore to its conventional roles. On the contrary, they should communicate and create strong ties with the industry to be more up to date and innovative. The symbiotic relationship between the university and industry is very crucial as the relation between the two can boost the economic advancement of a nation.

From the above quotation, one can understand that a strong knowledge-based relationship becomes a matter of survival than choice. Again, Burnside, *et al*. (2008: 26) strongly argue the viability of the 'go-it-alone' strategy to innovation is no longer convincing. Today, the complexity of issues and the need for a multiplicity of techniques require adequate discussion, the flow of ideas and knowledge exchange. This is especially true in the case of university-industry-government linkages. They further explained that "collaborate or die is the modern imperative" (Burnside, *et al.,* 2008: 26). Therefore, to remain competitive and viable on this globe producing competent graduates that satisfy the demand of the market seems mandatory. This needs knowledge-based collaboration to remain competent in order to respond to the felt needs of the society.

Cognisant of its importance, universities in different parts of the world have a long tradition of university-industry linkage (Nimtz, Coscarelli & Blair, 1995: 10). These traditions vary from country to country. In some cases, the government took the initiative to strengthen the relations through enactment. A typical example of the case

was the Bayh-Dole Act of 1980, which was initiated by the United States of America. As put by Mowery, Nelson, Ziedonis, Sampat and Snowdon (2004: 134) the act guaranteed small commercial enterprises and universities licence and patent rights to federally funded research which is usually indicated as a key input in the remarkable development of technology transfer and commercialisation efforts of American universities which, in turn, contributed to exacerbating the economic explosion of the 1990s. In confirming this, Wang and Lu (2007: 120) write that despite the growing interest to conduct research on knowledge transfer between university and industry, that the greater majority of them were conducted in the western world.

At a time of economic stagnation or crisis, governments put pressure on universities to come-up with solutions through research and technology transfer. On the other hand, stiff worldwide competition has put greater pressure on all segments of the industry to be extra-effective than ever. As Walsh, Baba, Goto, and Yasaki (2008: 39) put, “during the times of economic stagnation, the pressure put on the universities to come up with solutions were very strong. This was, in fact, true in the case of the USA in the 1970s and early 2000s where universities were forced to take their third role so as to contribute more vividly to the economic development through technology transfer, in the more tangible form of the patent-licence-start-ups. Consequently, it is strongly argued that governments all over the world value the meaningful collaboration of university-industry linkage as the remedy for managing crisis and boosting their economic growth. Although these arguments are strong, the relation remained young in developing parts of the world like Africa.

2.3. THE TRIPLE-HELIX MODEL

In various literature, Triple-Helix is the most cited model in the discourse of management of university-industry linkage. One of the major propagators of the model Etzkowitz (2002: 2) defines Triple Helix as “a spiral model of innovation that captures multiple reciprocal relationships at various points in the process of knowledge development”. The model examines the extent of internal transformation of each of the propellers, as noted in the development links between business and society, government and society, and university and its mission of development (Ranga & Etzkowitz, 2013: 238; Etzkowitz, 2008: 8). There are activities that are carried out

commonly and independently by the institutions during the process of interaction among the spheres (Etzkowitz, Dzisah, Ranga & Zhou, 2007: 14). From this, it is possible to understand that in the process of research and innovation it is difficult to treat the three spheres separately which may lead organisations to run for their own benefit at the expense of their common advantages.

As put by Magacho, Presa, Viana and Carneiro (2014: 6), the state, university and company constituting the basis for international relations of a national innovation system, must be backed by a solid education system, a system of efficient markets and a financial system consisting of strong institutions capable of investment. This, in turn, is influenced by difficult policies and strategies perused by the government.

Despite this, there is no clear demarcation between public and private, science and technology, university and industry as there is constant interaction between the spheres. The boundary is in flux (Leydesdorff, 2000: 245). The concept of Triple Helix is more complex than considering universities as an island, and the "mutual relationships between the state and university, academia and industry and state and industry have developed into triadic relationships among the spheres, especially at the regional level" (Etzkowitz, 2011: 2). This indicates the development of collaborations from bi-lateral to more interactive triparitative kind of interaction in which the three parties-university, government and industries equally take part. In the same vein, the sphere ranges from one in which the spheres are independent of each other with little or no interaction to one that controls the other.

The typology of the model commences with the great transformations of the 19thcentury century, which established a double helix of government-university interaction. This was the bi-institutional model of government and the industry. In this specific model, the market becomes the guiding principle of social interaction while the government will assume the role to moderate exchange relations to ensure a living wage (Etzkowitz, *et al.,* 2007:14). In relation to this, three different typologies of the triple-helix model can be dealt with.

As Etzkowitz, *et al.* (2007: 15) have put, the Triple Helix starts from three different points: it begins with self-standing institutional spheres that carry out its activities

autonomously: or one entirely encompassing and directing the others. Contrary to this, the international trend is towards a more interactive nature in which various spheres are interdependent and overlapping, not distinct but also not entirely merged either. These three typologies of the Triple Helix- statist, laissez-faire, interactive will be presented hereunder briefly.

2.3.1. Statist Triple Helix

This typology of the Triple Helix tries to organise various functions through central planning and co-ordination strategies (Etzkowitz, *et al.,* 2007: 21).It emphasises the dominant regulatory system carried-out by the government. The state or the government own both the university and industry and regulate the type of relation that exists between the two. It is a configuration, in which the government plays the leading role, stimulating academia and industry, which may consequently; limit the initiative and innovative capacities of the two institutions (Ranga & Etzkowitz, 2013: 239). In this case, both the industries and universities are working under the jurisdiction of the government with very little interaction (Etzkowitz, *et al.,* 2007: 16). The diagrammatic representation of this typology is presented as follows in Figure 2.1.

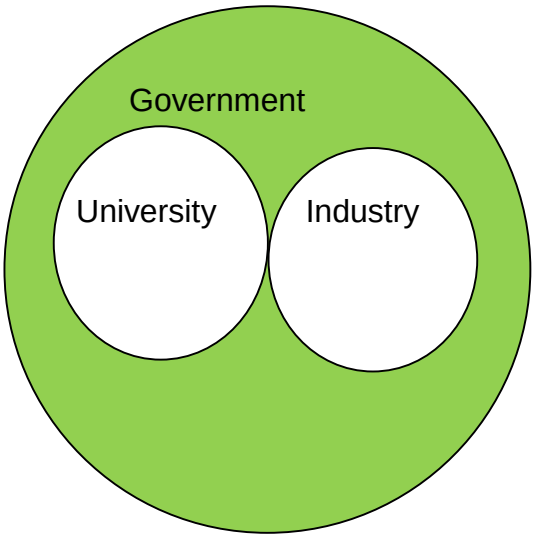

Figure 2.1. Statist Triple Helix typology (Etzkowitz, 2002:3; Ranga & Etzkowitz, 2013: 239)

As indicated in the diagram, the government controls, directs the activities of the industry and the academia– similarly, there is limited interaction between the industry

and the university. The government will determine what to do and how to do activities for both parties. This was the case in the former Soviet Union, to some extent in different Latin American and European countries before the 1980s (Etzkowitz, 2002: 3; Etzkowitz, *et al*., 2007: 21; Ranga & Etzkowitz, 2013: 239). Still, this model might work in developing countries, as many of the universities are government funded.

2.3.2. A laissez-faire Triple Helix

The second type of the Triple Helix is a laissez-faire kind in which the three parties operate independently of each other with limited or no communication. It encompasses three separate institutional spheres, where the state, academia and the industry are functioning independently of each other (Etzkowitz, *et al.,* 2007: 16). The authors further explain that the university offers basic research outputs and qualified workforce for the spheres. It contributes to knowledge production and human capital development. On the other hand, firms in an industry function entirely aside from each other in competitive relationships, connected through market failures, with solutions that the private sector cannot or will not provide. It is characterised by limited state intervention in the economy with the industry as the driving force and the other two spheres appearing as ancillary support system with limited responsibility in innovation - university performing mainly as the vendors of human capital and the state or the government as a regulator of social and economic mechanisms (Ranga & Etzkowitz, 2013: 239).This type of Triple Helix model explains loose alignment among the spheres as indicated by the broken line. The diagrammatic representation of this typology is depicted in Figure 2.2 below.

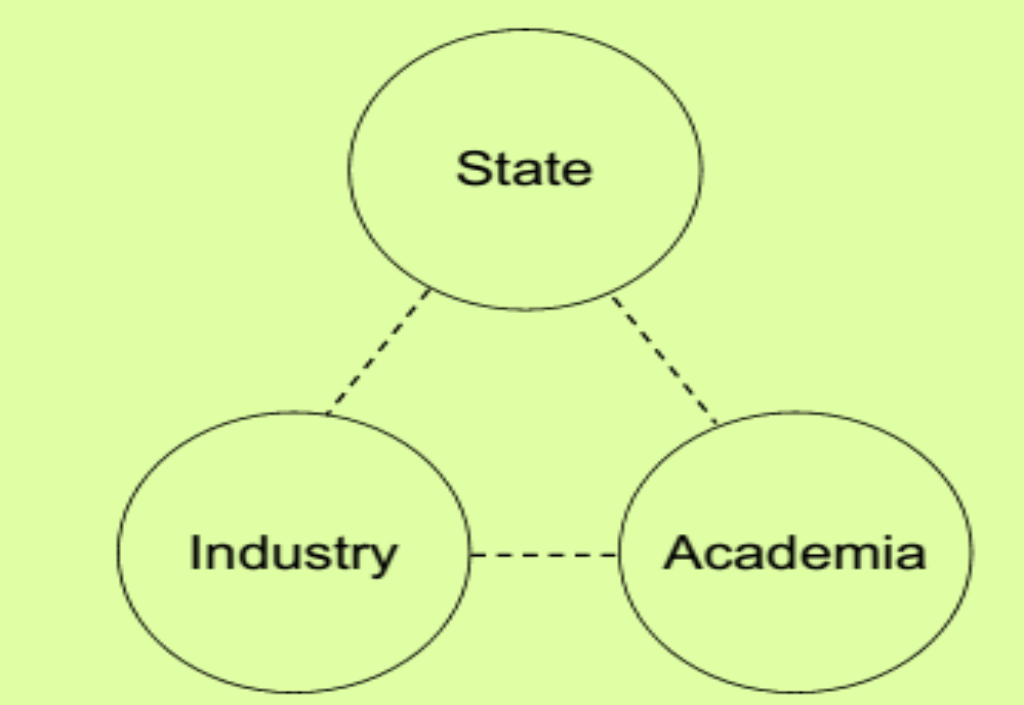

Figure 2.2: Laissez-faire (Etzkowitz, 2002: 3; Ranga & Etzkowitz, 2013: 239)

This typology gives special autonomy to each of the parties at the expense of common goals. This is the case in the USA and some Western European countries (Ranga & Etzkowitz, 2013: 239)

2.3.3. The Interactive/Balance Triple Helix

The interactive or balanced Triple Helix typology takes into account the common characteristics of the three spheres. This typology includes overlapping but independent, institutional spheres (Etzkowitz, *et* al., 2007: 16). Regions at various stages of development and with different inherited socio-economic and cultural belief systems have established a trilateral series of relationships among governments, universities and industries (Etzkowitz, 2002: 11). This is a paradigm shift from one dominating and controlling the other to more interactive, collaborative and tripartite relationships. In triple helix of university-government interactions, both advanced and growing nations experiment with locating better mixes of functions and institutions (Etzkowitz, 2007: 16). The schematic representation of the sphere is presented in Figure 2.3 as follows.

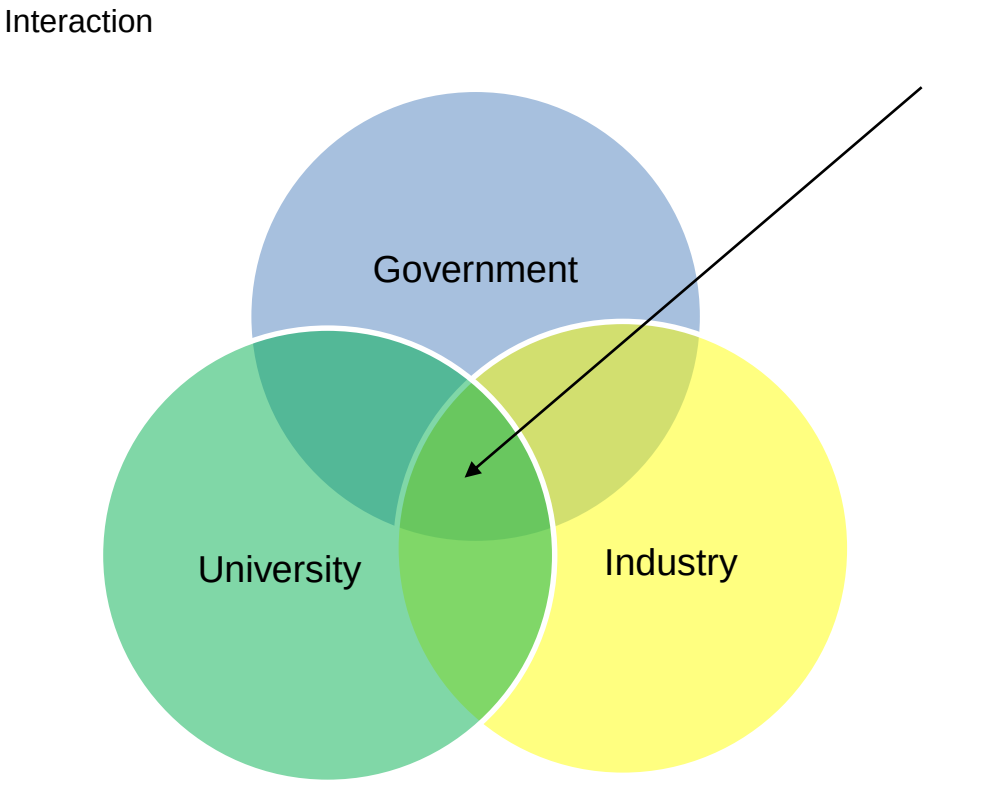

Figure 2.3. Balanced /interactive Triple Helix typology (Etzkowitz, 2002: 4; Ranga & Etzkowitz, 2013: 239)

The interactive configuration offers the vital insights for innovation because the most conducive milieu for innovation is established at the interaction of spheres (Ranga & Etzkowitz, 2013: 239). Despite all the typologies, there is no hard and fixed rule on how to maintain the best mix of the three parties. As Leydesdorff (2000: 243) puts it, "the Triple Helix thesis has meanwhile been elaborated into a recursive model of human overly of interactions operates on the institutional carriers. The institutions retain the hitherto best possible fits". Therefore, it is possible to understand that the ultimate choice depends on the social, economical, political and technological contexts of the industry, government and university. This leads us to the discussion of the roles played by each of the parties in the helixes.

2.4. THE ROLE OF THE PARTIES IN THE HELIX

In the interactive process of the Triple Helix, each party has the role to play individually, and they also have roles to play jointly. Accordingly, the role of each party is discussed in subsequent sub-sections.

2.4.1. The government (the state)

Governments in different parts of the world play a crucial role in strengthening the university-industry linkage. They put both universities and industries accountable for what they are producing and the function they play in the economic growth of a country. However, this is quite different based on the policy perused by the governments as well as the level of economic development of the country. Despite this, “universities are often included in government economic plans” (Altbach, 2011: 7). This implies that the activities and contributions of universities in the development efforts of a nation, as well as increasing global competitiveness, are the part of government’s plan.

In addition to this, governments have multi-faceted roles in supporting university-industry linkages. Magacho, *et al.,* (2014: 5) argue that the state has a role in maintaining a stable macro-economic environment, reducing economic crises and leveraging financial companies. It is further argued that the state should also promote credit lines to stimulate innovation in business and universities/research institutes, and a broader, but not least, invest in the country’s education system, based on the formation of intellectual capital of a nation (Magacho, *et al.,* 2014: 5; Etzkowitz, 2008: 63).

This could be by designing policy frameworks that guide the interaction among the helices. Moreover, the government can create a supportive environment for financial support from the industries through taxation and other research collaboration activities. In this regard, Etzkowitz, *et al.* (2007: 14) state, “the government must help to support the new developments through changes in the regulatory environment, tax incentives and provision of public venture capital”. From those explanations, it is possible to understand that the government plays a vital role in allocating resources, establishing regulatory policy environments (Ssebuwufu, *et al*., 2012: 11) and flattening the playground for the actors in terms of producing qualified manpower, research and technology transfer through university-industry linkage. Put specifically, the state may take actions in the formation of public policies that promote research and development, foster the reduction of uncertainties and stimulate investment in technological innovations (Magacho, *et al.,* 2014: 5). Therefore, it implies that the government plays

an irreplaceable role in making the linkage more interactive in a symbiotic manner.

2.4.2. The role of universities

The roles of social institutions like universities are very difficult to define. As indicated by Matheou and Saint (2005: 2) “universities remain multi-purpose organisations that assume the responsibility of teaching and research, also offer public services mainly working for the benefit of the community. Organisations which have this nature cannot simply be run like private enterprises that can operate solely for its own benefit”. This may involve a very high degree of speciality, unique inputs they require (students), and their strategic position in research and technology transfer. Writers in the field like Etzkowitz (2002: 1) state that with the establishment of the Triple Helix model of university, industry and government interactions, universities are expected to play a leading role in strengthening the relationship. This institutional configuration stimulates innovation and technology transfer among the spheres. Hence, universities assumed to take the prime initiative in forging the triadic relationship.

In addition to this, universities are expected to link international issues with the local contexts through knowledge production and transfer across the globe. As Altbach (2011: 7) notes, universities carry out their activities in the global milieu and bring science and scholarship from around the world to the local community. Consequently, they serve as central bridges with the international community. This is because universities have necessary intellectual and scientific infrastructure, which can easily disseminate their research outputs through information communication technologies and global networks. World academicians and esteemed professors actively engage themselves in doing intensive and extensive researches on challenging world problems. On the other hand, academic institutions are involved in the exchange of programmes, hostage of international staff and students, doing joint research projects (ibid, 2011: 7).This will help them to strengthen global partnership and experience sharing among academia across the globe.

Besides to their vital role in the international arena, universities and research institutes, in turn, are primarily responsible for developing the scientific and technological knowledge, from basic and applied foundation for innovation in the enterprises

(Magacho, *et al.,* 2014: 5). This may take the form of joint research centres, technology parks or establishment of joint research projects. This reveals how the linkage is strengthened with the industries.

In the process of fostering the linkage, leadership should play a vital role in figuring out and recognising the major changes observed in the academic institutions because they are large and structured organisations (Matthau & Sainti, 2005: 2). The writers further elaborated that communication and harmonisation of all activities are encouraged by the university management to ascertain efficient and effective university performance (Ibid, 2005: 6). The outputs that the universities produce are supposed to meet the demands of the market and the economy. On behalf of the university, leadership at different organisational hierarchy are expected to create a conducive work environment and act as the change agents in strengthening the linkage between the parties. Moreover, Mosia and Veldsman (2004: 26) state that leadership should identify new pathways for the organisation to follow, allowing it to build momentum for the future. Leaders may introduce the need for change in the organisation by evaluation of internal and external environments (Azhar, Ikram, Rashid & Sagip, 2014: 32). The degree of the linkage partly depends on the initiatives taken by the university leaders. In confirming this, Ssebuwufu, *et al.* (2012: 8) state that the vitality of leadership in terms of policy, as well as manpower requirements, was acknowledged as the major contributing factor for strengthening and enhancing the linkages. Therefore, university leaders are required to be the key actors in strengthening the relations and making the atmosphere more conducive for the interaction.

2.4.3. The role of industries

As indicated at the beginning of this thesis (chapter one section 1.13.3.), industries are all levels of the work environment, including primary (Agriculture, Fishery and Mining) to secondary (Manufacturing) to tertiary (service industry). The role of industries in strengthening the linkage with the government and the academic world is immense. Industries serve as the training grounds for the university graduates who join the labour market with the necessary skills and knowledge. In addition to this, industries also provide funds for the universities to promote research and technology

transfer. Even they may take the prime initiative to conduct joint research works. In relation to this Etzkowitz, *et al.* (2007: 14) argues that "by taking the initiative to develop training and research, the industry may also play a vital role similar to universities".

In addition to this, "when the ties between the industry and the university is potentially strong, the industry may also be able to increase local economic development by offering skill and productive human resources to create competitive advantages, who can make use of university innovations" (Hamdan, *et al.,* 2011: 791). Moreover, companies are directly responsible for innovation and locus of the innovation process because they have the mission to capture the knowledge of science and technology, develop, produce market and distribute the technology or knowledge derived from it, promoting economic development and local levels (Magacho, *et al.,* 2014: 6).

So far, attempts were made to discuss the roles played by the universities, governments and industries in promoting the linkage using the Triple Helix model. The following section tries to address the human capital theory as the major mission of universities to produce skilled and technologically advanced manpower that can easily adapt to the emerging economic demands.

2.5. THE CONCEPTS OF HUMAN CAPITAL THEORY

The concept of human capital theory was popularised in the sixties of the last century, based on the works of the economists of the Chicago school in which Becker, Mincer, Schutz and others belong (Soukup & Sredl, 2009: 13). The central theme of the theory is that education provides individuals with a better capacity to produce more, that is, it increases the marginal productivity of an educated individual worker relative to the one who is less educated or not so educated at all (Van Der Merwe, 2010: 107; Olaniyan & Okemakinde, 2008: 157; Acemoglu, 2013: 4; Soukup & Sredl, 2009: 13). The income differentials of educated and less educated individuals are taken as the base for the theory.

Human capital theory argues the importance of investing in cognitive aspects of human behaviour (Adelakun, 2011: 31). The justification for this investment is that, it is strongly believed that the character and pace of economic and social development

of a nation are ultimately determined by its human resources than its capital or material resources (Olaniyan & Okemakinde, 2008: 158; Adelakun, 2011: 31). This places a high value on the innovative and creative capacity of educated individuals reflected in increasing productivity and new ways of doing things. In fact, the existence of a positive correlation between the economic development of the nation and the quality of its human capital is manifested in both developed and developing countries of the world.

Education as a means of investment in human capital has been estimated since the late 1950s (Psacharopaulos & Patrinos, 2004: 11). Investment in human capital can be viewed from different perspectives. The application of investment in education was based on the strong assumption that it has multidimensional advantages at both macro and micro levels (Olaniyan & Okemakinde, 2008: 158). These theorists emphasise the high rate of return accrued from investment in knowledge development of a given individual through education. They explain the relationship between human capital and family development and community and the impact of this theory again on income and the repaying rate (Na, 2012: 437). In this regard, education plays an important role in acquainting individuals with the knowledge and skills required to increase productivity. In supporting this, Olaniyan & Okemakinde (2008: 159) propose two methods of modelling in which the rapid development of education increases growth and development.

Primarily, education is viewed as an investment in human capability. It is also seen from the role of education in boosting the economic development through its positive externalities or spill-over effects, as they spill over to other family members and the community at large (Psacharopoulos & Patrinos, 2004: 117; Olaniyan & Okemakinde, 2008: 159).This is the positive impact that the educated person has in leading quality life, using information communication technology, family planning and other related activities that indirectly affect the life of the others.

The second way of modelling is viewing human capital as the major ingredient for innovation, research and development activities, which is enriched through education (Olaniyan & Okemakinde, 2008: 159). It has a tremendous impact on the economic growth and development of a given society. They further elaborate that education

plays an irreplaceable role in an international endeavour to promote the resources required for creating new ideas; consequently, any increase in education will automatically augment technological progress.

The demand for technologically advanced skills and increased global competitiveness require investment in human capital. In favour of this, Bell and Stevenson (2006:8) argue, “the growing influence of globalisation has put pressure on countries to promote the skill development of their labour force”. To satisfy this skill gap, universities need to play a significant role in producing competent and technologically advanced graduates where the issue of human capital theory is mandatory to be applied. Concomitantly, UNESCO (2012: 5) states that the global economy demands well-trained and competent manpower, and universities are at the forefront to produce the required personnel to meet the ever-growing needs of both the employers and the nation-states.

2.5.1. The role of universities in human capital theory

The classical view of economic theory assumes that human capital is a commodity that can be sold and purchased (Marimuthu, Arokiasamy & Ismail, 2009: 267). However, the modern view of human capital theory believes that it is an investment in the cognitive aspect of human being, which in turn increases productivity (Abiddin & Akinyemi, 2013: 150). In this regard, training is well taken as the vital component of the human capital investment (Marimuthu, *et al.,* 2009: 268) which is obtained through various levels of education provided for the individuals.

In relation to this, universities stood at the heart of the issue in addressing the human capital theory. This is recognised as they are established to produce capable graduates through its teaching mission. It is also worth mentioning that universities are the centre of research and knowledge transfer for both the local community and the international world. In favour of this, Altbach (2011: 5) puts the teaching mission is the central responsibility of universities. The objective is to train individuals to work effectively in an increasingly technologically networked world. In other words, the university offers technical skills required for a diversified number of jobs and

professions that require sophisticated knowledge and education that implants the capacity to think meticulously.

From this, one can understand that the roles universities can play in producing well-qualified graduates, is its major contribution to the human capital. Moreover, higher institutions are supposed to take the lion's share of knowledge production through research and innovation. As put by Etzkowitz, *et al.,* (2007: 15) "so far, universities were initially viewed as sources of human resource and knowledge, and now seen from the perspective of technology transfer as well. Still more, the value of human capital theory in increasing firm's productivity was noted by Marimuthu, *et al.* (2009: 270). In this model, education, training, knowledge and skills are taken as the major attributes that increase human capital effectiveness. This, in turn, leads to firms' productivity. Therefore, universities are centres for human capital development through the provision of quality teaching in realising its mission.

2.5.2. Different views on human capital

There are different ways of viewing human capital by the theorists. The first of these theories is considering education as signal rather than a guarantee for increasing productivity. As argued by Soukup and Serdl (2009: 14) above all, screening theory evaluates education as an investment, enabling selection criteria among educated people as per the applicable qualities. This idea gives greater emphasis to the selective function of education. Observable indicators of human capital are largely signals of ability than characteristics independently beneficial in the process of production (Acemoglu, 2013: 5). The writer further explains the basis for human capital differences are their inborn abilities, level of education, quality of schools and non-school investments, training and pre-market impacts. This does not go in line with the neoclassical assumption of the exact equivalence. The extent of knowledge the incumbent employee has come from signals gained only by a limited amount of information (Soukup & Serdl, 2009: 14).

The other view of human capital was whatsoever the task may be human capital will increase productivity. Single or one-dimensional skill will promote the productive

potential of the individual employee. As pointed out by Acemoglu (2013: 4) the importance of human capital theory is well noted in the production process.

On the other hand, Gardener and Gardener (2012: 2) argue against the unidirectional aspect of human capital as there are various and a multitude of experiences and skills possessed by individuals. Mental and physical capabilities (health condition) of the employee will have an impact on the productivity of the individual. This idea was developed following the view of Gardener, a social psychologist, who imparted the development of multiple intelligences, specifically by focusing on how many extraordinary creative individuals or famous personalities were very 'unskilled' in some other aspects (Acemoglu, 2013: 5). This idea brought into the theory of human capital viewing individual skills from multiple directions and qualities that contribute to the productivity of the individual.

The other view of the human capital was viewing it as its ability to adapt to complex and difficult contexts. According to Schultz, Pasour (2013: 597) and Acemoglu (2013: 5), the importance of human capital theory is highly valued in dealing with 'disequilibrium' situations. This is specifically true in areas where there is the ever-changing and turbulent environment and where employees are required to adapt the existing change for the good of their organisation. The assumption of this perspective is viewing human capital as its ability to adapt individuals to the changing environmental and competitive global conditions. Others like Bowels-Gintis (2003: 82) observe human capital as the ability of the individuals to carry-out their activities effectively in the organisations and maintain orders. Put precisely, it shows their capacity to adapt to life in hierarchical capitalist society. Hence, education's role is assumed to acquaint people with the correct philosophy and approach towards life (Acemoglu, 2013: 5). However, this assumption undermines the creative capacity of the people that could be enhanced through education, that is, human capital development. This will lead us to the macro and micro aspects of human capital theory.

2.5.3. Macro and micro perspectives of human capital theory

The benefits accrued from human capital development and its underlying theories can be over-emphasised in the context of dynamic change in the economy, where human

attributes have been understood as the vital component of management (Akinyem & Abiddin, 2013: 150). In this regard, universities are slow to change to the kind of technological innovations demanded by an increasingly technology-driven economy.

The macro-economic perspective of human capital theory emphasises the importance of education in boosting economic growth. In this regard, education as a capital good refers to its ability to enhance the human resources required for social and economic transformation (Olaniyan & Okemakinde, 2008: 157). The macroeconomic benefits of human capital theory are witnessed in different parts of the world. As stated by Loomis and Rodriguez (2009: 510), the impacts go far beyond the institution as the attainment of education has become more directly associated with external wage inequality and the general quality of life of those people living in different parts of the world like North America, UK and its commonwealth, in the whole Europe, India and also in Far East.

From this, one can understand that human capital development is a means to reduce inequality among citizen and a way to lead a quality life. In support of this, Olaniyan and Okemakinde (2008: 158) pointed out that “more than anything else; it has been found that the major descriptor of growth in East Asia that has given education and human capital wide-acceptability in the fields of economic growth and development”.

In its micro-economic advantages, human capital theory discusses the income differential as the result of extra levels of education. In support of this, Dahlin (2010: 8) has pointed out that micro-economic analysis of human capital tries to assess the impacts of education on the individual’s income. People with a better level of schooling, generally by far, earn a greater income than those who quit their schooling earlier or with less level of education (Loomis & Rodriguez, 2009: 510). This is mainly as the result of the enhanced intellectual capacity of the worker with the objective of increasing productivity, performance and overall outputs of the organisation, which may ultimately raise the income and yield of the individual as well as the organisation (Akinyemi & Abiddin, 2013: 150).

The other point that should be given emphasis on human capital theory is the role of education in boosting the entrepreneurial endeavours to innovate new products and technology (Olaniyan & Okemakinde, 2008: 159). This is related to the strong

assumption that 'human being as creator' who designs knowledge, skills, competence, and experience developed by forging relationships between the 'self' and the environment on a sustainable basis (Kwon, 2009: 2). The creative capacity of human beings in the age of knowledge-economy is very high which has a direct relationship with the development of human capital. The macro-microanalysis of human capital theory is best summarised by Michaelowa (2000: 2) who viewed education as a means to increase productivity and a way to get significantly promising returns is presented in Fig. 2.4 below.

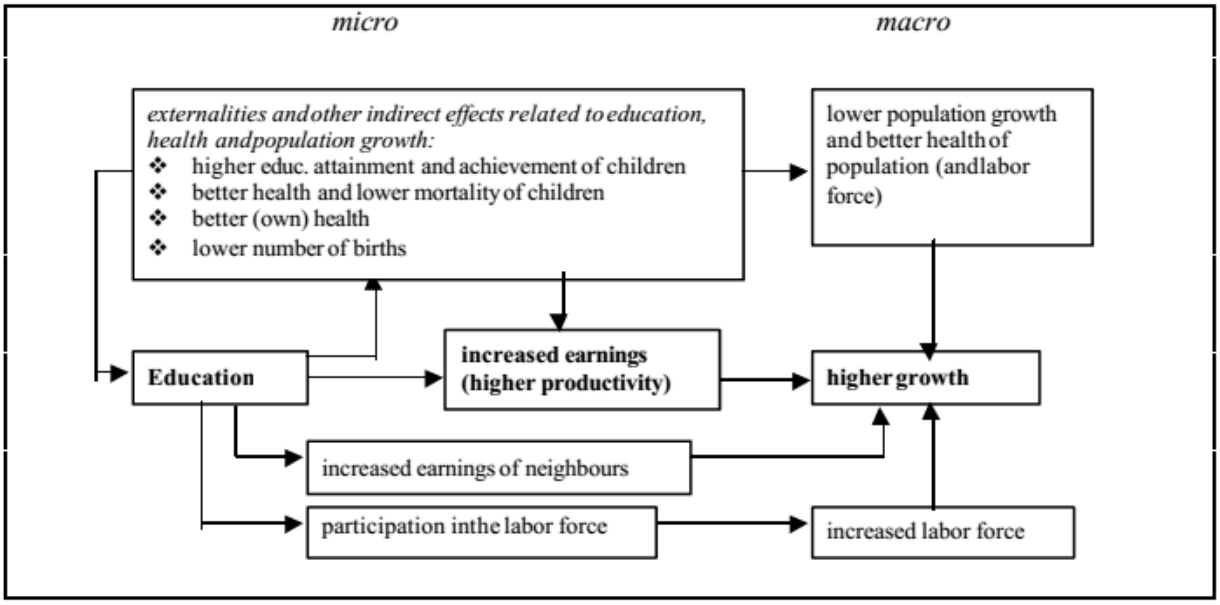

Fig. 2.4: Macro and micro benefits of education (Michaelowa, 2000).
"Returns to education in low-income countries: evidence from Africa"
http//www.hwwa.de/projects/Rs programmes/RP/Development process)

2.6. CONCEPTS AND ORIGINS OF SYSTEMS THEORY

The term system theory is becoming the catchword in the day-to-day life of the individuals and organisations. The pioneer of the theory Bertalanffy, (1969: 3) indicates that "If someone were to analyse current notions and fashionable catchwords, he would find 'systems' high on the list". This shows the popularity of the theory in today's context.

Although systems theory is popularised after World War Second (WWII), it has a long history of the ancient philosophers. As put by Baker*, et al*. (2000: 5), “General systems theory has developed over time. Its roots can be traced back to ancient philosophers, but it was not until shortly before World War II with the writings of Ludwig Von Bertalanffy, an Austrian Biologist, that some of the ideas developed”. In its earliest stage, the term had different names like “Natural philosophy” (Bertalanffy, 1969: 11). However, by introducing various new ideas and proposing its application to various disciplines, the idea of ‘general systems theory’ was first introduced by Bertalanffy (Bertalanffy, 1969: 11).

Conceptually, a ‘system’ is a set of elements that function as a whole to achieve a common purpose (Betts, 2003: 38). It is also defined as complexes of elements standing in interaction (Bertalanffy, 1969: 11). A system is a whole which cannot be taken apart without loss of its essential characteristics; hence it must be studied as a whole (Johnson, 2001: 135).

It is a theory that “shed light on the whole, not just the parts; one that is synthetic, rather than analytic; one that integrates, rather than differentiates” (Betts, 2003: 38). Hence, it is possible to understand that system is a set of elements that interact with each other on a continuous basis to achieve system’s purposes. The role of each of the parts constituting the system as well as achieving the purposes cannot be undermined. In its broadest sense, general systems theory has become a set of principles, tools, problems, methods and techniques related to systems (Barker, *et al.,* 2000: 5).

In systems theory, the conception that “the whole is greater than the sum of its parts” (Mizikaci, 2006: 43; Barker, *et al.,* 2000: 135; Betts, 2003: 38) has got laudable sounds in popularising the theory. This is because the interaction among the elements will add value to the overall performance of the system (Betts, 2003: 38). Hence, the nature of the parts are determined by the whole, and at the same time, the parts are interrelated dynamically with each other; cannot be viewed independently from the whole (Mizikaci, 2006: 43). The interaction of the elements with one another internally and with the external environment will determine the effectiveness of the goals. The

reciprocal relationship between the parts and the whole exists in producing quality outputs.

The other point that should be given emphasis in systems theory is the impact of the environment on the proper functioning of the parts or elements in particular and the system in general. As put by Barker, *et al.* (2000: 5) systems should be considered with its interacting parts not only as a separate whole, but also as interacting with its external environment. Hence, the theory treats the system as a unitary whole interacting with its external environment on a continuous basis.

The basic assumptions underlying system theory emanates from all definitions and concepts above. In this regard, systems have their own overarching goals or purposes for which they are established (Mitikaci, 2006: 43; Betts, 2003: 40; Barker, *et al.,* 2000: 6). In some cases, the goals might be simple and easily defined while in others it may be very difficult to define. Hence, they may subject to highly pluralistic interpretations with many conflicting goals (Betts, 2003: 40).

Another assumption of systems theory is that they have inputs from the environment (Mizikci, 2006: 43, Barker, *et al.,* 2000: 6). Depending upon their goals and purposes, organisations take different kinds of inputs (human, material, financial, information, energy or time) from their environment for their survival. Accordingly, the following subsection briefly discusses systems inputs, boundary, process, outputs and its cyclical nature.

2.7. SYSTEM COMPONENTS

Organisations, in these case universities, can be viewed as a transformational model containing various components, which are continuously interacting. They have boundaries that delineate them from the external environment, inputs that help the organisations to function properly, have throughput or process so as to produce outputs. For its survival and continuous operation, organisations are expected to evaluate the outputs they produce which will lead to its cyclical nature. Hence, the following sections briefly discuss system components.

To begin with, organisations have boundaries. Depending upon their degree of interaction with their environments, systems can be open or closed (Johnson, 2001: 135; Betts, 2003: 38; Mizikaci, 2006: 44; Hansen, 1995: 4).

- **Closed systems** refers to systems alienated from the external environment. As put by Johnson (2001: 135), an organisation may be sufficiently independent of its external environment so that its problems can be analysed in terms of internal structure, tasks, and formal relationships. This is particularly true in physical sciences and mechanistic system. However, this might be very difficult in the education system where inputs are obtained from its environment.

- **Open systems** have a high degree of interaction with their environments. Educational institutions (universities) take inputs from their environments. Intellectual and financial inputs are usually taken as the primary types of energy for the proper functioning of the system (Betts, 2003: 40). Open systems are in continuous interaction with its environment. In this case, the university is viewed as an open system. It obtains inputs from the society in the form of students, materials, finance and information (Johnson, 2001: 135). In a similar vein, it also exports outputs in the form of graduates that contribute to the economic development of a nation. In addition to this, universities exchange their research output with the external environment of which industry is one. It is assumed that a bi-directional relation exists between the university and its external environment. Hence, it is possible to recognise that no educational institution will sustain itself without the interaction of its environment.

Despite all these, the issue of openness and closeness is a matter of degree (Johnson, 2001: 135; Betts, 2003: 40). In addition to this, the difference between open and closed systems depends on the degree of exchange of energy across the boundaries (Hansen, 1995: 5).

The other important component that helps the organisation to function properly is systems inputs. They are various resources needed to run the programme or the organisation (Mizikaci, 2006: 41). In the case of the education system, they may take the form of student characteristics, faculty members, financial resources, facilities, programmes, support staff and so on (Johnson, 2001: 135; Mizikaci, 2006: 48). Education as the open social system receives energy from its environment in various ways (Betts, 2003: 39; Hensen, 1995: 5). Even outside of the system, the electoral board of education may provide policy directives and various regulatory mechanisms to the university representing the will of its constitute (Hensen, 1995: 5). If the organisation is to be successful in receiving input from the society, it must conform to society's social requirements (Johnson, 2001: 136). Hence, inputs quality and quantity will determine the type of interaction and the quality of outputs from the system.

The third important component in systems theory is the interaction/the process/throughput aspect. As pointed out by different system theorists, throughput is the transformation of inputs or energy in some way that is valuable for the existence of a system. It is how the programme is carried-out (Mizikaci, 2006: 41). The manufacturing industry may process raw materials into products, and the education system transforms multitudes of inputs like educational theories, financial resources, characteristics of incoming students, community beliefs and values, instructional resources into applied knowledge and skills exhibited in the pupils who went through such complex processes (Hansen, 1995: 5).

The ultimate goals of organisations are to produce quality outputs that enhance customer satisfaction, systems sustenance and growth. In line with this, educational institutions receive inputs of energy, information and materials from the environment, transform these, and returns output to the environment (Johnson, 2001: 135). As pointed out by Mizikaci (2006: 41), the outputs of the education could also be viewed from the perspectives of the services rendered. For instance, the number of clients served, the number of students counselled, students taught, research work published, community and other service recipients communicated with and so forth. Hence, outputs are the products of a given system that are exported to their environment. In the case of universities, competent graduates and research outputs that add value to the existing body of knowledge are considered.

Lastly, educational institutions operate in such a way that they ensure their continuity through uninterrupted monitoring and evaluation systems. The exchange of energy between a system and its environment is cyclical in its nature (Hansen, 1995: 6). To sustain itself a system should design strong feedback obtaining mechanisms to produce or provide quality services.

In general, universities can be viewed as open systems, which have many subsystems. The subsystems are in continuous interaction with other subsystems to produce quality outputs (graduates and research outputs). Universities are also operating in the larger environment called supra system, which subsumes local, national and international universities. In the era of knowledge-economy and information, universities cannot alienate themselves from the environment in which it is operating. Hence, viewing universities from the perspective of the external environment is the issue of system thinking.

2.8. THE APPLICATION OF SYSTEM THEORY

Systems theory has wider application in various fields. As pointed out by Bertalanffy (1969: iii), “the fact that systems theory is a broad view which far transcends technological problems and demands, a reorientation that has become necessary in science in general and in the gamut of disciplines from Physics to Biology to the Behavioural and Social Sciences to Philosophy”. The assumption of the theory was searching for general principles of the organisations, which holds true for all systems (Mizikaci, 2006: 43). Its applicability begins from simple mechanistic system, industrial enterprises, system design and analysis to very complex space engineering and sophisticated social systems (Bertalanffy, 1969: 3)

Despite this, “the systems concept in its present state remains hidden in functional textbooks and obscured jargon of the discipline. Only when new ways of thinking are adapted and practised with the full potential of the systems be realized” (Barker, *et al.,* 2000: 5). In support of this Betts (2003: 38) argued that “the word ‘system’ has been advocated without basic recognition of its implication, the extent that everything is labelled as a system, but none -of them is considered as one”. In actual cases, there are misconceptions about the theory in applying it in the actual field.

2.9. APPLICATION OF SYSTEMS THEORY IN EDUCATION

Writers like Hansen (1995: 4) contend the application of the term “system” in the education system as it has several legal and useful applications in expressing and interpreting the mechanisms by which it is organised and conducted. Systems approach applies to the education system as it has several interacting sub-systems to produce qualified manpower. As pointed out by Betts (2003: 38), beginning from its establishments, public education has been there to develop and transmit core cultural values, take custodian care and get ready students for life after school. Of all these responsibilities, critical and creative thinking in solving problems and their ability to make decisions are taken as vital ones.

This is applied through a systems approach. This is true as systems approach demands innovative ways of thinking and alleviating problems by considering an action taken by one of the subsystems as having an impact on other subsystems (Barker, *et al.,* 2000: 3)

In addition to this, educational planners usually use words “system”, “system change” and systematic approach (Hansen, 1995: 1). The term “system” also applies to a broad spectrum of the physical, biological and social world (Johnson, 2001: 135).

Universities are complex institutions with multiple goals where various variables interact. In support of this, Mizikaci (2006: 50) pointed out that universities are composed of continuously interacting subsystems, keeping the whole system open and ever growing, and encapsulated into the larger supra-system. Moreover, educational reformers should view systems as complex, pluralistic, open and teleological (Hansen, 1995: 1). In addition to this, “--the application of general systems theory, viewing the university as a system, composed of subsystems which interact with the external environment” (Barker, *et al.,* 2000: 3). Therefore, educational institutions are viewed as open systems with vision and goals and integrating individual goals with the goals of the system (Hansen, 1995: 1). The writer further argues that they should have a well-defined method of communication across barriers using feedback strategies to maintain dynamic homeostasis and plan for future improvement in the larger environment.

Viewing university as a system, different researchers have developed different models. The first of this scholar was Barker, *et al.* (2000: 16) who divided the university having sub-systems like Faculty, technology, central administration, library, student service and support staff system. The model puts the central administration at the centre with a solid circle, which limits the information flows among the sub-systems. In fact, the model depicts the inputs to the system and output from the system. However, the boundary is also solid which seems it is closed, which is unreal in social systems like universities.

The other writers who viewed organisation as a system were Kast and Rosenzweigh (1985: 17) with different subsystems like structural sub-system, technical subsystem, managerial subsystem, psychological subsystem, goals and values subsystem. In their model, they depicted the input-output flow of materials, energy and information among the subsystems and with the external environment. The model also shows environment as the supra-system, which exchanges inputs and outputs with the systems. However, the interaction aspect or the process aspect is not indicated in the model, which is very important in the education system. Moreover, the boundary seems a solid line, which may refer to a closed system.

More recently, Mizikaci (2006: 43) has developed a systems approach to programme evaluation model. The model contains the social system, technical system containing inputs, transformation process, output and the managerial system. It contains the detailed analysis of the subsystems as indicated in Figure 2.5 below.

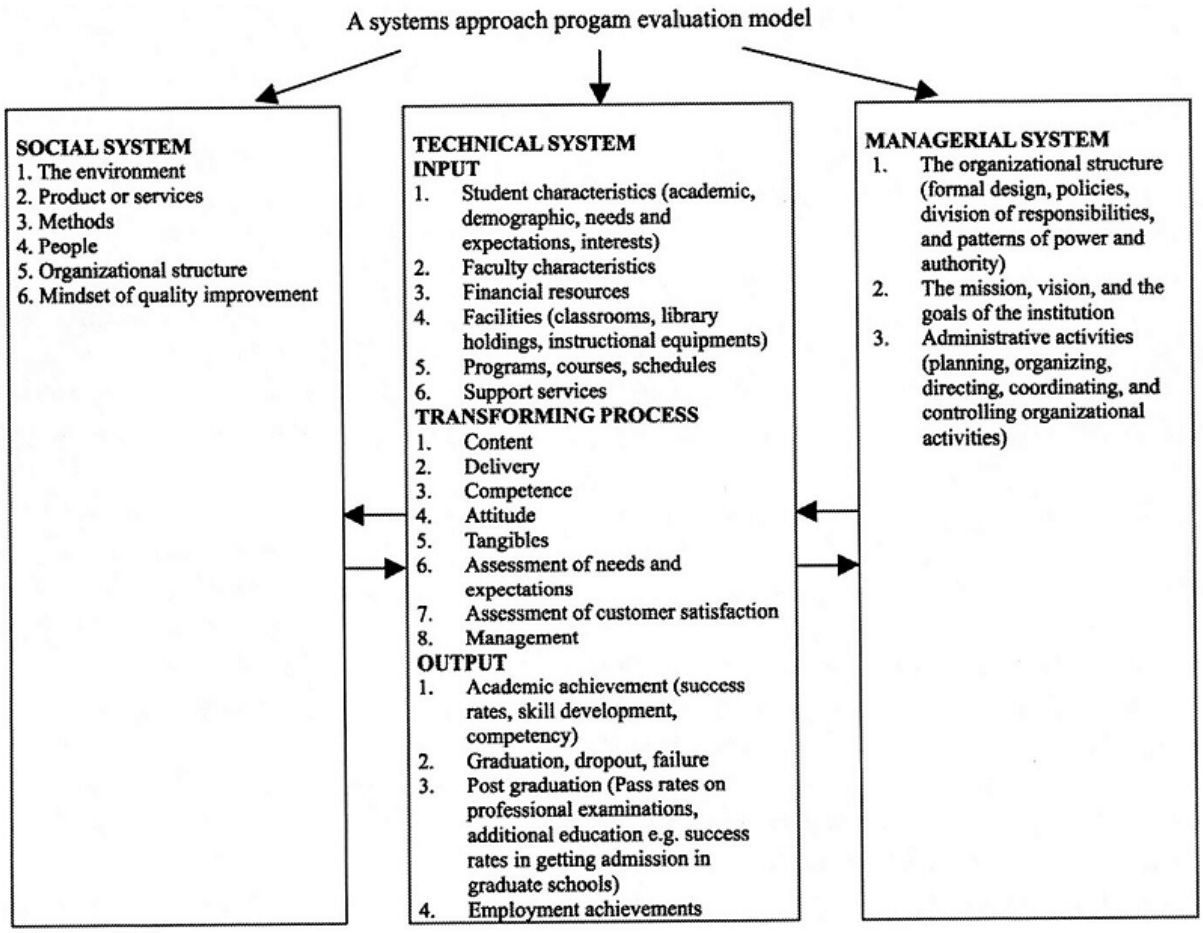

Figure 2.5: System model in educational institutions (Mizikaci, 2006: 43)

In the model, universities are expected to communicate with their social system, specifically with their environment. As explained by Mizikaci (2006: 44), universities have exposure to external influences and interactions on the application of quality accreditation systems; communicate on the issues of job market through which they may acquire valuable insights for their future adjustment.

In general, this model of system evaluation for analysing university-industry linkage is quite relevant. Hence, system's thinking to a university helps managers to adapt to a new way of thinking. As pointed out by Barker, *et al.*, (2000: 14) this requires two basic points:

1) The managers would think from a system approach and would consider how inputs from the external environment would influence internal subsystems. The outputs of the system - the university, to the external environment would

also be considered.

2) Systems thinking would cause various leaders to relate their goals to university goals. Rather than considering changes form a narrow, functional view, the overall institution becomes a focus."

Therefore, this broad view of the system thinking applies to this study.

2.10. CONCEPTUAL FRAMEWORK FOR THE STUDY

In describing the social realities of modern and complex organisations, a single model may not suffice to show the interacting variables vividly. Especially, the roles and functions expected to be played by universities are sophisticated. Cognisant of this, the conceptual framework underlying this study framed based on the human capital theory, systems theory and the Triple Helix model.

As indicated at the beginning of this chapter, human capital theory emphasises the creative and innovative capacity of human being that is obtained mainly as the result of education. It is about building the stock of human capital to increase productivity at both the individual and the national level. In this regard, universities are placed in the vortex of accomplishing this role.

The other point that deserves special attention is the view of systems thinking. System theory views educational institutions (in these case universities) as a transformational model, which has inputs from the environment, a process within the system and outputs from the system. Universities obtain human, material, financial, time and information inputs from the environment in which they are operating. These inputs interact within the system to produce outputs. In this case, the major process is the teaching-learning process. On the other hand, effective interaction among the subsystems (the managerial subsystem, structural, psychological, goals and value) subsystem (Kast & Rosenzweigh, 1985: 17; Johnson, 2001: 135), the social system, technical system and managerial system (Mizikaci, 2006: 43), faculty subsystem, support staff subsystem, central administration subsystem, library subsystem, student service subsystem (Barker, *et al.,* 2000: 16) are continuously interacting to produce qualified graduates. One can easily understand from the above lists that management

plays a central role in the interaction process both within the system and with the external environment. As indicated above, effective interaction (the process aspect) will ultimately determine the quality and quantity of the outputs to be produced. In line with this, the issue of quality graduates (human capital) is coming to the board. Here, the conceptual framework of the theories (System theory and Human capital theory) with the Triple Helix model is represented in Figure 2.6 below.

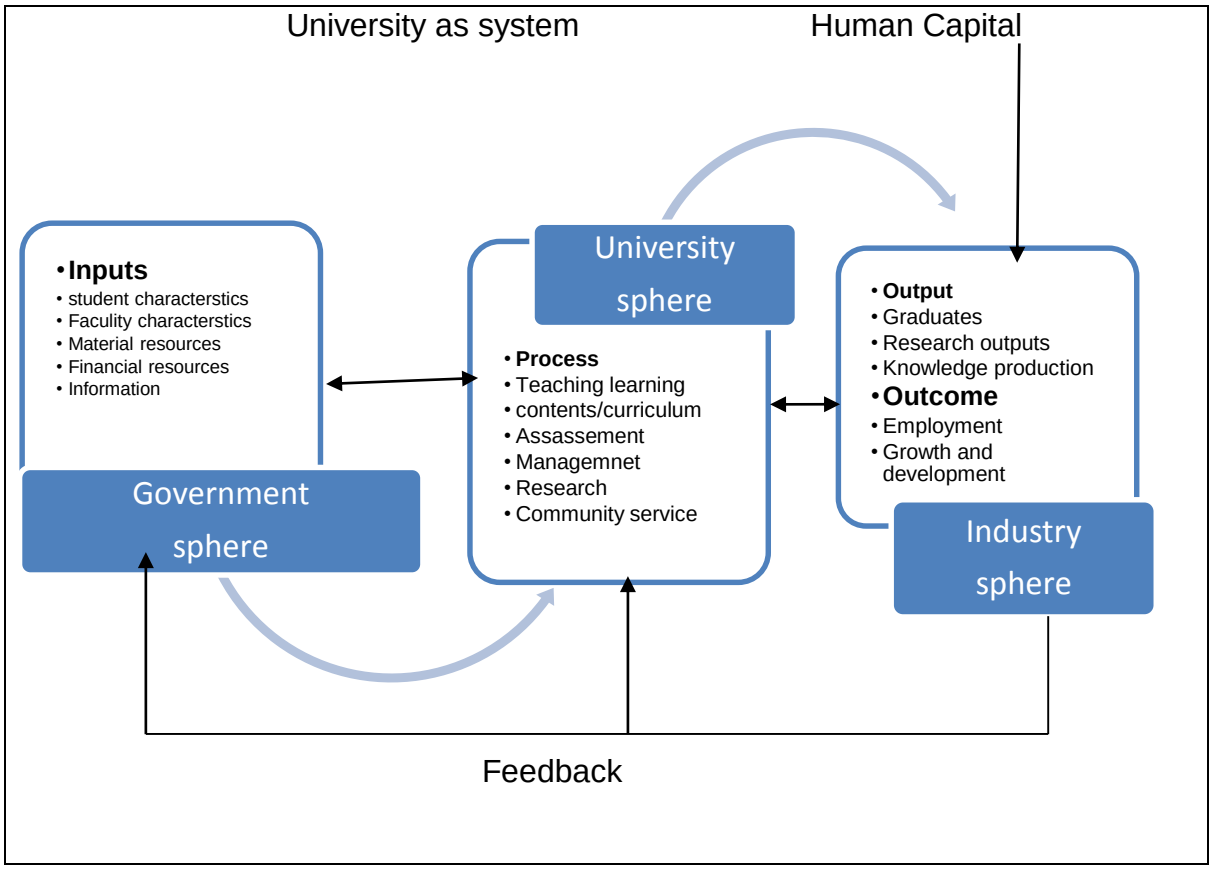

Figure 2.6: Conceptual framework for the study

As indicated in Figure 2.6 above, universities take students with certain characteristics from their environment as input. They also recruit and train faculty members, material resources, financial and information for their proper functioning. The inputs are also processed in some way and finally produce research outputs and qualified manpower for the economy. The labour market absorbs the knowledge produced as well as qualified manpower produced by the universities. They also provide feedback for the improvement of each of the parts and keep the system cyclical. On the other hand, the government is also there to maintain balance for the proper functioning of the

university and the industry. In most cases, governments set rules and regulations, and provide a safeguard for systems functioning. In developing countries, governments take the lion's share of resource allocation for universities. Universities are also liable to respond to the quality of their research outputs and knowledge production.

The basic questions developed in chapter one and the instruments designed for data gathering were also viewed in relation to this framework. To address the input variables, it was assumed that management plays an irreplaceable role in promoting the linkage. Therefore, planning, organising resources, staffing and decision-making activities were raised in basic question number two to address the level of management of UIL in government universities of Ethiopia (Refer to chapter one). Moreover, government attention is required by setting relevant policy platforms, structures and allocating resources, which was considered in basic question No 4. Accordingly, alignment was made between the conceptual framework, research questions and method of data analysis.

In addition to this, benefits obtained from UIL were also designed to see the outputs received so far from the linkage, which was again addressed in basic question number 2. As a process, areas of linkage were also exhaustively considered both in quantitative and qualitative part. Similarly, the design of the questionnaires for the three groups of respondents (prospective graduates, university instructors and management bodies) were designed in line with the conceptual framework (Appendix E-G). Interview protocols and FGD guidelines were also developed to satisfy this purpose (Refer appendix H-L). Finally, the analysis was made as per the conceptual framework using concurrent mixed design (Refer chapter five). In general, this study revolves around this conceptual framework.

2.11. CONCLUSION

In this chapter, different theories and models related to university-industry linkage were discussed. It began with university-industry linkage from a global perspective. It discussed the growing demand for the linkage with the advancement of the knowledge-economy and technology transfer across the globe. The importance of collaborations between university and industry was emphatically reviewed.

The chapter also discussed the Triple Helix model, which describes the interaction between the government, university and industry. The concepts and three different typologies of the helix were also treated. In statist typology, the government encompasses both the university and the industry. This typology gives greater controlling power for the government. The second typology was laissez-faire kind. This typology is again characterised by limited government intervention and provides little room for innovation. The third typology is interactive/balanced type in which the three parties take the initiative to strengthen the linkage. In fact, this was discussed as the paradigm shift from one dominating the other to more interactive nature for the common good of the three parties in particular and the society at large.

Moreover, the chapter revealed the roles played by the three parties in the helix. It is indicated in the chapter that governments have the mission of laying fertile ground for proper linkage by setting relevant policies, guidelines, rules and regulations. On the other hand, universities should take active role in human capital development, research, innovation and technology transfer. The role of industries as a source of finance and creating room for joint research work were also parts of this chapter.

As universities' central mission of producing capable, technologically advanced and skilled citizens, the issue of the human capital theory was addressed. It started with the concepts of human capital theory by citing classical theorists in the field. It also discussed different views of human capital theory like signalling, screening and multidimensional advantages of investing in the cognitive aspects of mankind. Benefits accrued from investment in human capital were also sought from macro and micro aspects.

Systems theory was also taken as the major underlying assumption in university-industry linkage. The concepts and components of system theory and its application in the educational institutions were also treated. It viewed universities as system continuously interacting with its environment.

Finally, this chapter developed the conceptual framework of the study by integrating human capital theory, systems theory and the Triple Helix model. Following this, the third chapter reviewed the related literature on the university-industry linkage.

CHAPTER THREE
GLOBAL PERSPECTIVES ON UNIVERSITY-INDUSTRY LINKAGE AND OVERVIEW OF THESTUDY CONTEXT

3.1. INTRODUCTION

This part of the thesis discusses the review of related literature from different sources. Concepts of university-industry linkage (UIL), its historical development and the rationale for university-industry linkage are included in this section. In addition to this, UIL the case from the African context and benefits accrued from forging such relationships are addressed. UIL in Africa is also challenged by different factors - low enrolment, poor quality graduates, low research output, low spending, lack of supportive policy environment, and so on. This is also the part of this section.

University-industry linkage (UIL) is operating in the political and socio-economic contexts of a given country. In this case, the political and socio-economic contexts of Ethiopia are included under this section. In addition to this, the industry sector is also briefly discussed. The education sector and its levels (primary, secondary, TVET and higher education) are briefly reviewed. Special emphasis is given to the reforms made in the Ethiopian higher education system so as to understand the changes made in higher education landscape. In this regard, attempts of expansion of higher education in the country, privatisation and cost-sharing issues are included in this part. Finally, managing UIL in the Ethiopian milieu in terms of planning, finance and curriculum are also addressed. Hence, this chapter overviewed different scholarly related literature to broaden the understanding of university-industry linkage.

3.2. CONCEPTUALISING UNIVERSITY-INDUSTRY LINKAGE

The concepts of university-industry linkage have got wide popularity with the increased roles of universities in economic development and enhanced global competitiveness in knowledge production and transfer. As it was discussed in chapter two, university-industry linkage is currently viewed from the roles of the government, university and industry perspectives. In relation to this, various literature conceptualised the issue of university-industry linkage by forging a symbiotic relationship among these three role

players (Ranga & Etzkowitz, 2013: 237; Leydesdorff, 2000: 243; Etzkowitz, Dzisah, Ranga & Zhou, 2007: 14). These parties have different roles to play.

The government may help by setting regulatory frameworks, providing start-up financial benefits and resolving issues related to intellectual property (IP) rights. Similarly, universities may take initiatives to conduct problem-solving research and disseminate their research outputs to the society. In the same vein, the industry may collaboratively work with the academia by sponsoring researchable projects and establishing joint innovation centres. Other exchanges could be more frequent, ranging from providing consultancy services and sponsored research to the exchange of personnel or various forms of technology transfers (Vielba & Esquinas, 2011: 240). In fact, the partnership among the three spheres by far goes beyond the listing of simple roles of each of the parties, as their interaction will bring about more benefits to the society.

Traditionally, the central mission of universities was producing competent manpower that the economy demands through teaching and learning. Through the process, however, research was also seen as the major activity to be carried out by universities in collaboration with teaching and learning. More recently, the expectation from universities in enhancing the frontiers of knowledge to the global world has become more prominent (Bloom, Canning & Chan 2006: i; Tumuti, Wanderi & Thoruwa, 2013: 26). Their roles far go beyond the university compound, which traditionally put universities as *ivory tower* entities alienated from the global world.

3.3. RATIONALE FOR UNIVERSITY-INDUSTRY LINKAGES

In current information age society, numerous factors urge organisations for collaboration. Forging relationships with the government, university and industry is not an exception to this. In addition to this, the multivariate nature of problems that requires multidisciplinary approaches call for interaction, smooth flow of ideas and knowledge exchange among organisations (Burnside & Witkin, 2008: 27; Ahmed & Jumani, 2013: 201). Such an approach emphasises the interactive nature of the industrial innovation process, leading policy-makers to induce collaborations among higher education institutions and other research organisations and industry (S'a & Litwin, 2011: 425). In

this regard, university-industry collaborations may take different forms at various levels of collaborations from the contract or sponsored research, to joint research, provision of professional courses and consultancy services to arranging opportunities for student placements, staff mobility and curriculum development (Ssebuwufu, *et al.,* 2012: 11; Derbew, Mungamura & Asnake, 2015: 73; Abraham, 2016: 2). Hence, these dynamic and multifaceted activities require a strong bond of UIL.

The other pressing factors that justify the need for university-industry linkage is economic dynamism (shifting from industrial to information), change in the nature and intensity of technological development, the emergence of the competitive global market and enhanced competitiveness than ever (Bell, 1996: 322; Ahmed & Jumani, 2013: 201). The economy is changing from industrial to information, which requires adequate knowledge. Similarly, technology is changing rapidly in un-presented rate demanding a knowledge-intensive economy than labour-intensive economy. Global market also demands skilled manpower, which can create and add value to the already established knowledge and enhance competitiveness in the global arena (Walsh, *et al*., 2008: 39). In this regard, one of the several mechanisms through which higher education institutions/universities are reacting to this intense global competition is by including university-industry collaborations and partnerships into their plans (Tumuti, Wanderi & Thoruwa, 2013: 16).

Cognisant of its prime importance, esteemed world-class research universities are standing at the frontline in establishing such collaborations (Edmondson, Valigra, Kenward & Hudson, 2012: 3). Hence, the justifications above call for global partnership, collaboration and interaction so as to address the felt needs of the society. This is again imperative to remain competitive and viable in the global world.

3.4. UNIVERSITY-INDUSTRY LINKAGE: A HISTORICAL PERSPECTIVE

Historically, universities and industries have been collaborating long ago. Literature on university-industry partnership divides the collaboration into revolutions. The first academic revolution goes back to the 19th century and assumed to integrate research activities totally to the academic mission of the universities (Rodrigues, 2009: 3612). It was against the *ivory tower* mentality of universities, which focused on the provision

of knowledge. This was criticised on the ground that universities should not be alienated from the society; rather, they are expected to improve teaching and learning through research. Hence, this criticism paved the way for the revision of the roles of the universities. Accordingly, many researches proved the inseparable nature of research and teaching.

On the other hand, the second academic revolution tries to limit the relationship between the university and the society to the links of the university and the world of production, that is, to the dynamics of university-industry collaborations (Rodrigues, 2009: 3612). The restriction of university-industry linkage to the world of production has a negative effect in boosting the economic development of a given society. The partnership was again mainly limited to knowledge production and joint research works. However, the emergence of the global knowledge-economy has increased the felt demand for a strategic partnership that goes beyond the conventional funding of discrete research projects (Edmondson, *et al.,* 2012: 3). As a result, more emphasis was again given to the transfer of knowledge than production and creation of partnerships.

The third academic revolution puts greater emphasis on the third roles of universities in technology transfer (Jurado, Lucio & Huanca, 2008: 206). In this regard, universities are expected to involve more actively in the economic development of a nation through technology transfer, particularly in an observable form of the patent licensing start-up technology transfer (Walsh, Baba, Goto & Yasaki, 2008: 39). The initiation of the third roles of universities increased in the last two decades because of 'globalisation' and the establishment of the 'knowledge-economy' which brought fresh economic, social and political and cultural challenges to which nations, regions, universities and other institutions are reacting (Cloete, Bailey, Pillay, Bunting & Maassen, 2011: 3). In relation to this, inadequate response of research universities to social problems with greater accountability is among the challenges, which the globe is required to respond. From this point of view, universities are usually seen as strategic assets in innovation and a major contributor to the economic development and also problem solvers for issues affecting their nations (Ssebuwufu, *et al.,* 2012: 8; Abraham, 2016: 1; D'Este & Patel, 2007: 1296). This places greater responsibility and accountability on universities as they are mostly funded by the government, which in turn collected from the taxpayers.

Consequently, the third academic revolution is about the change of research outputs into intellectual property, exchangeable commodity, and economic advancement (Brennan, King & Lebeau, 2004: 36; Rodrigues, 2009: 3612).

This role took legal ground in some countries, like the United States of America through enactments like Bayh-Dole Act, which guaranteed universities and licensing rights for federally funded researches. This gave universities the opportunity to commercialise their research outputs, which are the aspect of technology transfer (Mowey, *et al.*, 2004: 134; Walsh, *et al.*, 2008: 50). Several similar IP related issues were given attention to strengthen UIL globally.

The roles universities are expected to play globally to bring competitiveness and solving problems take the focus of the governments. In responding to these challenges, the role of universities in producing skilled and technologically advanced manpower, conducting innovative and problem-solving research so as to alleviate those problems are highly imperative. In this regard, universities are assumed to take a central role in the development affairs of a given country.

It is widely recognised among governments that university-industry linkage is vital in alleviating social, economical, political and technological challenges of their nations. Countries across the globe took the initiative to expand universities to produce qualified manpower that forges such relations. As a result, demand for higher education increased alarmingly, despite acute resource constraints. Internationalisation of students or student mobility augmented with the aim of experience share and proliferation of comparative and international education.

In relation to this, Altbach, Reisberg and Rumbley (2009: 4) argue that, “universities have usually been influenced by global trends and to some extent functioning within the larger global community of academic institutions, scholars, and research. Nevertheless, realities of the 21st century intensified the vitality of the global context”. They are increasingly recognised for their potential to contribute to R&D and innovation, and consequently, governments around the world are taking action to foster an enabling environment for strengthening university-industry linkages

(Ssebuwufu, *et al.*, 2012: 15). Hence, there is a well-recognised shift towards strengthening university-industry linkages across the globe.

These shifts in the academic world took several forms in terms of programmes offered an increase in students' enrolment. As put by Altbach, *et al.* (2009: 4) the landscape of higher education has changed dramatically in the past half a century marked by transformations unprecedented in coverage and diversity. This will create a knowledge explosion by making research and innovation imperative. Concomitant with this, there is a continuous increase in student enrolment in the universities. Globally, between the year 2000 and 2010 the proportion of adults who acquired tertiary education increased from 19 percent to 29 percent, all the projections recommend that this growth will sustain despite at the slower rate (Gibney, 2013: 1). The writer further explains that globally, the number of students who will be enrolled in higher education institutions are estimated to reach 262 million by 2025, up from 178 million in 2010 (Gibney, 2013: 1). This implies commitment of additional resources, the creation of strong university-industry linkage, visionary leadership who can play an active role in the promotion of such linkages both on the parts of the university and the industry.

In addition to enrolment expansion, there is a pressing demand for global partnership and agreements as about 2.5 million students, innumerable scholars and degrees and universities are moving across the globe freely (Altbach, *et al.,* 2009: 4). The past decade has also shown a real expansion in the number of programmes and institutions that are functioning (Altbach, *et al.* 2009: 4). This makes the creation of positive university-industry linkage necessity than a matter of choice.

Despite the above improvements, hierarchies were established among world universities in their ability to produce competent graduates and research outputs. This is in turn affected by the quality of staff universities have, physical facilities and resources committed to this endeavour, which may put developing countries at their disadvantaged positions. In relation to this again Altbach, *et al.* (2009: 6) contends that the academic world is dichotomised into centres and peripheries based on some characteristics. Esteemed and strong academic institutions are usually categorised as centres because of their academic coverage and reputability for excellence. African universities, for instance, have found in highly challenging and complex situations to

find their footing on the international edge of higher education. They are rarely, listed in the international rankings and league tables, and produce a small proportion of the international research outputs. For instance, according to web metrics ranking of universities, out of 23,892 universities found in the world, one can rarely find one African university among top 300 (CSIC, 2016: 14). The *Consejo Superior de Investigaciones Científicas (CSIC)*, the biggest public research entity in Spain, ranks universities based on the aim to encourage their academic web presence, assisting open access initiatives for significantly increasing the transfer of scientific and cultural knowledge produced by higher education institutions to the entire society (CSIC, 2016: 14). This has created a wide gap among universities in terms of resource allocation, quality of research outputs produced and disseminated, quality of manpower deemed to conduct research as well as the number of partnerships to be created with the universities. This is partly the result of poor UIL, as the strong relationship will bring about greater research outputs, strong support for sponsored and joint research projects and knowledge transfer among those role players.

3.5. UNIVERSITY-INDUSTRY LINKAGE: INTERNATIONAL EXPERIENCE

Internationally, different countries have varied experiences in strengthening university-industry linkage. They set policies and reforms that help them to create an interactive platform for this purpose. The United States of America (USA), United Kingdom (UK), China and Japan have good experiences in managing university-industry linkage. Moreover, countries like China and Japan had shown remarkable economic growth as the result of decentralising university-industry linkage to the regions. These countries are in general among the top in knowledge production and technology transfer. In other words, they are the leading in innovation and production of quality research outputs. To ascertain the global picture of university-industry linkage, they are taken from different parts of the globe. Their experiences are presented briefly in the following section.

3.5.1. University-industry linkage in the United States of America (USA)

University-industry linkage in the USA has a strong foothold. Predate WWII, there was attention given by the government to strengthen the university-industry linkage in the

United States. The Morrill Act (1862) created the land grant colleges, focusing on Agriculture and Engineering, Hatch Act (1887) emphasised on funding agricultural experiment centres and in the early 20th century the offices of technology transfer were established in the USA (Walsh, 2013: 7). During this time, the major attention was granting of the establishments of colleges and places for conducting agricultural experiments.

In the late 20th century, with the increased roles of universities and the issue of competitiveness, special attention was given to technology transfer. In this regard, special credit was given to Bayh-Dole Act of 1980 which established similar sets of rules that arranged universities to take the title of federally funded inventions and providing patent rights exclusively (Walsh, 2013: 7; Bradley, Hayter & Link, 2013: 3). The law gave universities permission to commercialise their inventions. Consequently, the number of Technology Transfer Offices (TTOs) and the number of employees increased, especially after 1991 (Bradley, Hayter & Link, 2013: 8). The TTOs tried to centralise the entire university invention and commercialisation activities by requiring formally or informally to organise their efforts (Bradley, Hayter & Link, 2013: 9). Following this, many Acts were passed on strengthening university-industry linkages in the USA. For instance, the Basic Research Tax Credit (1986) permitted industries a tax credit for outsourced research and development, by motivating industries to conduct research agreements with the universities (Walsh, 2013: 8). The United States of America highly acknowledges that moving universities and industry in separate ways put competitiveness at risk (Burnside & Watkin, 2008: 27). As a result, universities in the USA have strong ties with the industries when compared globally.

3.5.2. University-industry linkage in the United Kingdom

The importance of university-industry linkage is well recognised in United Kingdom (UK). Similar to the United States of America, universities in the UK had a long history of forging relationships with the industries (Hughes, 2006: 4). They have well-established science and innovation system, and British scientists have contributed several scientific discoveries to the world. The government of United Kingdom (UK) also strongly believes in science and innovation to become a flourishing knowledge-economy (UK, 2014: 10).

Universities in the UK are among the top in promoting knowledge frontiers across the globe. Through its world-class universities, UK is playing a major role in promoting university-industry linkage. From a total of 150 universities found in the UK, 42 of them are among the top 100 universities across the globe (Innovation Report, 2014: i). UK universities ranked 9th in global competitiveness index, stands 7th in terms of its overall research and development funding, constituting 3 percent of the world total (UK, 2014: 15). In addition to this, accounting only four percent of the global researchers, the UK contributes 6 percent of global articles, constituting twelve percent of citations and sixteen percent of the most widely cited journal articles (Innovation Report, 2014: 4). This partly shows the quality of research produced in the country. As put by the British government (UK, 2014: 5) “their scientists have made discoveries that have opened the eyes of humanity to secrets about ourselves, our world, and places and times beyond what we know before.” This puts them in a better position in forging and strengthening the relationships between universities and industries.

In addition to this, the UK government has strong support for university-industry linkage to promote long-term productivity and prosperity. It believes that research and innovation is a major engine that drives growth. Hence, the government took the prime initiative to push ahead the frontiers of knowledge and development and exploitation of new technologies as its central mission (Innovation Report, 2014: 5).

Universities in the UK again have well established international cooperation and networks with different institutions, organisations and companies. They have strong ties with international researchers and research institutes. In relation to this, the innovation report of UK indicated that “the United Kingdom has strong international collaboration, with this well-established overseas link; again, they are able to attract high-level foreign investment, consequently, becoming the choice of destination for high-quality researchers” (Innovation Report, 2014: 4). Scientific partnership becomes their major agenda to bring sustainable development.

United Kingdom (UK) has established different guidelines and organisations that support research and innovation. For instance, the research excellence framework (REF) evaluates the quality of research in universities of the UK for better funding. In addition to this, higher education institutions in the UK receive research fund in the

form of block grant linked to their performance in the research framework analysis which is conducted periodically and the recent revision was related to the performance in the period 2008-2013" (Hughes & Kitson, 2012: 4). They also have research councils that contribute to the quality of research produced. Natural Environment Research Council (NERC) is also supporting issues related to the management of the environment. Funding for universities is, therefore, competitive based which helps them to produce quality research output.

Currently, the UK government has allocated £5.9 billion to science capital from 2016 to 2021 to build a modern infrastructure for innovation. In addition to this, it has announced eight great technology areas: satellites and commercial application of space, big data and energy efficient computing, synthetic biology, robotics and autonomous systems, agri-science, advanced science and nanotechnology, regenerative medicine, and energy and its storage (UK, 2014: 17). In relation to university-industry linkage, UK universities like Cambridge even include representatives from their nearby industries as a board member of their universities. Hence, they have strong potential to identify areas of partnership in promoting research and innovation.

3.5.3. University-industry linkage the Chinese experience

University-industry partnership in China had a young history as compared to the United States of America and the United Kingdom. Its relation began as early as the 1950s (Nezu, 2007: 6; Xue & Zhou, 2011: 47). Beginning from the communist era, higher education institutions in China were called upon to provide meaningful contributions towards the increment of production as the country's economy was in a state of "shortage" (Nezu, 2007: 6). At times serious economic problems universities are standing in the frontline in addressing these issues through research and technology transfer where university-industry linkage is considered as the vital instrument.

As pointed out by Xue and Zhou (2011: 35), prior to 1978 when Chinese economic reform began, the Chinese economy was centrally planned, and the state directs and controls the largest share of the country's economic output, which also set production

goals, regulated prices and allocated resources through most economies. It was under the tight control of command economy, which required the strong intervention of the government in any development activity.

After a change of policy in the 1980s in China, more attention was given by the government to increase the productivity through the mobilisation of academic and scientific resources to bring about economic growth and development. In this regard, the decision made by the central committee of the Chinese Communist party in 1985 marked a turning point for the reform of scientific and technological policy of China. This reform paved the way for universities to arrive at their own decision, based on the market contexts in coordinating research and development programmes and translating new technologies into marketable opportunities. Moreover, the decision made allowed to offer better incentive mechanisms through the principle of “more pay for more work”. Here, it has to be well noted that the role of the government has dramatically shifted from direct intervention and control to support, guidance, oversight, setting rules and regulations, which authorise universities to decide on the issues related to their mission (Nezu, 2007: 6).

The Chinese government has been focusing on strengthening university-industry partnership to stimulate knowledge transfer and promote innovation (Wang & Lu, 2007: 121). In its university-industry linkage strategies currently, China is pursuing dramatic change from labour and capital-intensive investment to technology-intensive production (Cai & Lui, 2013: 7). Interms of research output, China has shown a great improvement in the last decade. The share of highly cited Chinese journal increased approximately by a third between the years 2008 and 2012 (Innovation Report, 2014: 34). The report also further explains that citation impact of Chinese journals increased from 0.70 to 0.76 over the same period.

3.5.4. University-industry linkage Japanese experience

Despite its overwhelming success in industrialisation after world war second, the collaboration of university-industry linkage is a recent phenomenon in Japan. Traditionally, Japan had a strong tradition of a centralised system in relation to

university-industry linkages (Kitagawa & Woolgar, 2008: 55). However, with the increased demand of university in the development of society, university-industry linkage was established as a policy direction in the late 1990s (Kitagawa & Woolgar, 2008: 55).

In Japan, the law fostering technology transfer from the university to the industry was issued in 1996 in an attempt to promote a smooth transfer of technology. This was followed by the second law of 1999, which created a fertile legal ground structure the same to that of the Bayh-Dole Act of the United States of America (Nezu, 2007: 14). Following this, in 2004, the most important law was passed in Japan, which puts universities as an independent administrative entity separate from the government (Woolgar & Kitagawa, 2008: 56; Nezu, 2007: 14). The reform changed the status of national universities into 'corporate' entities. In fact, the aim of this law was beyond increasing university-industry partnership and it also includes the freedom to conduct research, and to increase public accountability. The major cause for this dramatic change in the landscape of university-industry linkage was lack of competitiveness of the Japanese firms in the global market as compared to the firms in the United States of America, especially in the fields of information communication technology and biotechnology (Nezu, 2007: 6).

In Japan from 1996 to 2015 the total expenditure allocated for research and development increased from 17.6 trillion yen to 25 trillion yen in its 780 universities - 86 National, 95 local and 599 private universities (Saito, 2013: 16). The focus of the plan was on basic research, human resource development and realisation of sustainable growth and societal development in the future. Efforts were made to regionalise universities to initiate local governments and to promote efficiency. As a result, universities were merged and encouraged to strengthen their financial base (Woolgar & Kitagawa, 2008: 56). National funding systems were used on a competitive basis to achieve those objectives.

In its 29 cluster innovation centres, regionalisation reforms in Japan resulted in increased number of patents, article publications and sales of related products. For instance between 2002 and 2010, the number of patents granted were 3,829 domestically and 692 internationally (Saito, 2013: 25). The writer further elaborates

that 4,655 domestically and 9,435 internationally accepted publications were produced as the result of this regional innovation. This again resulted in 82.2 billion JPY (7.53 billion EUR) from the sales of products (Saito, 2013: 25).

3.6. UNIVERSITY-INDUSTRY LINKAGE: THE AFRICAN CONTEXT

Like in other parts of the world, there was a huge expansion of universities in Africa in the last couple of decades. According to web ranking of universities, there are 1417 universities in Africa (CSIC, 2016: 14). Across these institutions, there are considerable variations in programme type, length, specialisation and expertise. North Africa has the largest number of higher education institutions (39%), followed by West Africa (20%), East Africa (18%), Central Africa (13%), and Southern Africa (11%) (Ssebuwufu, *et al.,* 2012: 15). These universities host a huge number of students who aspire to graduate with different programmes and disciplines. African universities are supposed to acquaint the graduates with adequate knowledge and skills that help them to be competitive both locally and internationally. In relation to the growing demand of students to join universities, there is need to create and strengthen partnership with the industries.

As put by Ssebuwufu, *et al.* (2012: 12), in situations where there are serious financial constraints, high graduate unemployment, and the need for universities to show greater responsibility to the society and high expectation to react to the national development agendas, the topic of university-industry collaborations are becoming more prominent in the dialogue of African higher education institutions. In emerging nations, universities serve as the major link to the world of science, scholarship and intellectual life. Concomitantly, in many of the African countries, where internet facilities remain poor, universities are serving as the bridge linking the university with the society in particular and the external world in general (Altbach, 2011: 7). In the era of global networking and intensification of knowledge-economy, universities provide up to date scientific outputs from around the world to the society. They serve as a bridge between the world scientific community and the beneficiaries including the industries. Therefore, interacting more closely with industry and the productive sectors represents one avenue to enhance the relevance of universities in the economic development of their countries. Thus, the agenda of university-industry collaboration

is regularly coming to the board in higher education policy discourse in Africa (Ssebuwufu, *et al.,* 2012: 15). Experiences of many African countries show that there is a weak relation between universities and the industries (Nyerere, 2013: 8). However, Egypt, Nigeria, South Africa and Kenya have better experiences. In terms of their rank in intellectual property rights, South Africa stands 39th, Egypt 41st, Kenya 66th, and Nigeria stands 78th globally from Africa (WIPO, 2015: 8). They relatively play a greater role in innovation when compared with other African countries. Although seven African countries are included in the rankings, these countries are the leading from their regions- Southern, Northern, Eastern and West African regions.

In South Africa, there is relatively better university-industry collaboration than other African countries as the government made different reform programmes to improve its innovation system. Telecom South Africa has built centres with different departments found in South African universities. Internationally, South African universities have strong relationships with other universities across the globe through projects like the Hartebeesthoek Astronomy Observatory, working on the areas of radio astronomy, space geodesy and satellite ranging (Wandiga, n.d.: 2). In fact, this was supported by the IPR Act No.51 of 2008 which gave a strong foothold in the innovation system of South African universities. As stated by Bansi (2016: 207), efforts were made to transform the innovation landscape by offering guidelines for the proper utilisation and management of IP originated from government-sponsored research. The number of universities was reduced from 36 to 23 to decentralise the education system and increase the role of universities in the economic development of the country from 2002 to 2006 (Bansi, 2016: 199). Following this reform programme, the participation of universities in the national innovation system got wide popularity in contributing to the economic growth (Bansi, 2016: 199). Despite the blossoming of university-industry collaboration in South Africa, the relation is constrained mainly by the lack of understanding (Van Zyl, Amadi-Echendu & Bothma, 2007: 3).

Similar to other countries of the world, Nigerian universities were established with the mission of contributing to the national development agenda (Bogoro, 2015: 7). Beginning from the Yaba university higher education in 1948, Ibadan University remained the only university in Nigeria until 1960 (Joshua, Azuh & Olanrewaju, 2015: 20). They also added that Nigeria has 37 state universities, 38 Federal universities

and 50 private universities making a total of 125 (Joshua, Azuh & Olanrewaju, 2015: 20). University-industry linkage in Nigeria got more attention with the Technology Act CAP. F23 and Agricultural Act CAP F22 of 2004 (Bogoro, 2015: 7). Through these acts, universities were given a strong mandate to solve agricultural and technology related problems through research, innovation and technology transfer.

University-industry linkage in Egypt is in a better position both in North Africa and Maghreb regions. As the result of this collaboration, the number of employees involved in industries increased. By strengthening this collaboration, Egypt plans to become the most innovative centre by 2025 from both Middle East and North African countries. In this regard, Egypt ranks 4th from the Middle East and 41st globally in terms of its scientific research output (Zakhary, 2013: 5). It has more than 26 well-established research centres and 16,255 researchers in the ministry of scientific research, Agriculture, communication, education, electricity and energy, health, housing, industry and water resources (El-Din, Kash & Fahmy, 2012: 25; Zakhary, 2013: 2). The writer further explains that Egypt ranks number 135/142 in terms of its university-industry collaboration (Zakhary, 2013: 13). Different organisations and institutions are working to increase university-industry collaboration in Egypt like Agriculture research centres, industrial modernisation centres, information on technology development agency, national research centres, technology transfer offices and so on to bridge the gaps between the academia and the industries (El-Din, Kash & Fahmy, 2012: 26). Hence, it can be said that university-industry integration is well coordinated in Egypt as compared to other North African countries, though; it is constrained by a reduction in expenditure and heavy brain drain (Zakhary, 2013: 13).

Lastly, Kenya is in a better position in its university-industry linkage from East African countries. Beginning from its independence in 1963, Kenya has made tremendous efforts to bring about country's development through science and technology (Nyerere, 2013: 10). Public and private universities, industrial training institutions and polytechnics were playing a major role in university-industry linkage through manpower training, collaborative research, advisory services and consultancies (Munyoki, Kibera & Ogutu, 2011: 163). Currently, the Ministry of Education, Science and Technology is in charge of the management of Research and Development. The ministry provides the overall national policy guidelines on science and technology,

whereas the National Council for Science and Technology (NCST) undertakes the advisory and co-ordination functions (Nyerere, 2013: 12). The government took the initiative to strengthen the integration of university-industry linkages in its national development plan (Munyoki, Kibera & Ogutu, 2011: 163).

Kenyan public universities have strong collaborations with other universities in the developed world. The University of Nairobi, for example, has ties with universities found in Belgium, Germany, United Kingdom (UK) and the USA. Similarly, Moi University has relation with Indiana University found in the USA and the Free University of Belgium. The major focus of their collaboration is in ICT infrastructure development, Doctoral and Masters Training, faculty and student exchange and joint research programmes (Wandiga, n.d.: 4). The writer further notes that Kenyan universities have collaboration with the inter-university council of East Africa (IUCEA). In this, they support student mobility and joint research projects. Within the country, Kenyan universities have been collaborating in joint purchase and development of internet bandwidth as members of the Kenya Education Net Work (KENET). KENET co-ordinates joint production and access to teaching materials and research databases for its faculty members (Wandiga, n.d.: 4).

In addition to this, universities in Kenya were trying to establish collaboration with the industries. For instance, Kenyatta University, through the directorate of community outreach and extension programmes, entered into a five-year renewable co-operation with the Equity Bank since 2008 (Tumuti, Wanderi & Thoruwa, 2013: 28). It aimed at providing services to the community through training in the spirit of corporate social responsibility. Despite this, university-industry linkage in Kenya is weak (Munyoki, Kibera & Ogutu, 2011: 163). In Kenya, the problem is attributed to ineffective coordination between various actors, poor harmonisation of research policies, limited research funding (0.6 percent of GDP-with less disbursement), less focus on applied research, limited arrangement for dissemination, utilisation and banking of research outputs (Nyerere, 2013: 8).

From the above experiences of different countries, it could be learned that governments had tried to strengthen UIL through various policies, reforms and acts. In some cases, the reforms were aimed at creating regional universities in order to

promote decentralisation. Consequently, universities were given greater autonomy, competitive based resource allocation, patent rights and the discretion to participate actively in solving societal problems through research, innovation and technology transfer. Moreover, the roles of the government were shifted from direct control to provision of support and guidance. Many organisations were also established in different countries to assist in the promotion of UIL. Hence, it got a greater attention than ever.

3.7. PROBLEMS RELATING TO UNIVERSITY-INDUSTRY LINKAGE IN AFRICAN UNIVERSITIES

The problems of university-industry linkage in Africa are multi-faceted. As put by ADEA (2012: 8), many higher education institutions in Africa lack an enabling environment for reorienting their institutions towards a more entrepreneurial role. African universities, for example, experience various challenges in relation to the structure of their economies, political contexts, and institutional research capacity. Thus, despite the relatively small expenditures on R&D in some developing countries, including many African ones, universities are significant contributors to what research is being undertaken, thus providing justification for fortifying the role of these institutions (AAU, 2012: 15).

Comprehensive list of the problems of university-industry linkage in Africa pointed out by ADEA (2012: 43) is worth mentioning*:*

> *HEI linkages with the industry are in Africa are constrained by inter alia: low numbers of qualified faculty, including doctorate degree holders; brain drain, ageing faculty, and other issues associated with retention; low enrolment in maths, engineering, and other science-related disciplines against large enrolments in social sciences and humanities; inadequate research infrastructure at many universities and lack of access to up-to-date publications; funding constraints; and teaching rather than research-focused mandates.*

Generally, the major challenges related to African universities are lack of supportive policy environment, lack of visionary leadership and management, low student enrolment, irrelevant curricula, weak research outputs and poor quality graduates. Each of them will be discussed hereunder.

3.7.1. Lack of supportive policy environment

Properly designed supportive policies to university-industry linkage foster the role of the universities in multidimensional development efforts of a nation. Governments in different parts of the world at different times took the initiative to strengthen the relationship through policy formulation and enactments.

University-industry collaborations have potentially become one of the most important points of discussion in higher education policymaking and the economic context of both local and international levels (Tumuti, *et al.*, 2013: 26). This is due to a strong assumption that the socio-economic development is enhanced by the existence and application of supportive policy environment.

Even though most institutions have highlighted industry linkages in their strategic plans, many face shortages of clear, supportive policies and strategies for guiding and regulating interaction with the productive sector (AAU, 2012: 13). The lack of supportive policy environment has a great impact on the level of UIL, IP and other related issues.

The other point that may take the attention of policymakers and academicians is the number of resources, specifically financial resources, allocated for universities. There is a strong belief that quality research outputs depend on the quality of academic staffs, the number of financial resources allocated and the fertile ground laid by the government to conduct research. In this regard, the number of financial resources allocated to universities may play a pivotal role in determining the quality and centrality of the universities. In the benign economic environment, where there are better resources, universities are better funded by both the government and the industries. This again puts developing nations and their emerging universities at the disadvantaged position and places special pressure on most academic institutions

confronting the dilemma of enrolment expansion and the need to assist top-quality research universities (Altbach, *et al.*, 2009: 7). Increased enrolment in student population urges both the government and university leaders to shift their priorities to the physical expansion of universities at the expense of the quality of research produced. Consequently, this will reduce the strength of UIL as the result of poor quality graduates or inadequate research outputs. This will again limit the impact and reputability of universities in the international world. On the other hand, this dilemma is solved partly by the number of resources allocated by the government to the universities and the priority given by the government on the value of research outputs. This will determine the quality of research outputs that the universities produce.

Despite this, there was a dramatic change in funding the education system by international funding agencies like World Bank, IMF and other organisations. The focus of spending was changing from tertiary education to primary. For instance, between the years 1985 to 1989 global education sector spending to higher education institutions by the world bank was 17 percent, this number significantly decreased between 1995 to 1999 to just 7 percent as attention was shifted to primary education with the international agreement held in Jomtien in 1990 (Bloom, *et al.*, 2006: 4). The shift in the allocation of fund from higher education had a negative effect on UIL, as most of the major recipients of the support were developing countries. However, there is a strong understanding in recent years that the expansion of universities will bring significant changes in the socio-economic development of countries.

3.7.2. Poor leadership and management

The notion of management sometimes coincides with that of leadership, a concept of modern interest in most developed nations of the globe (Bush, 2007: 2). For the classical theorists like Fayol, managing means looking ahead, and foresight was an essential element of managing (Wren & Bedeian, 2009: 222). In this case, it focuses on planning, the essential and primary function of management. He also viewed envisioning the future to adapt the organisation to the future uncertainties and the current realities. Managing is also maintaining effectively and efficiently the current organisational arrangements (Bush, 2007: 2). However, this definition undermines the role of managers to maintaining the *status quo,* which is difficult in the ever-changing,

turbulent and globalised environment in which information flow is extremely rapid and global competition is stiffer than ever. In support of this, Chang (2008: 2) states that, albeit its varying degree, all education systems across the globe are subjected to rapid changes, most often inspired by globalisation, commercialisation of some educational services, information communication technology development, stiff competition, the shift of conventional values and paradigms. Hence, managing university-industry linkage in this context refers to the roles played by leaders/managers of the university, industry and the government in coming up with the dynamic world.

Because of these complexities, managers are expected to focus on strategic issues that can value-add to the development and improvement of the society through UIL. In this regard, Pearce and Robinson (2007: 3) view "strategic management as a set of decisions and actions that result in the formulation, implementation and control of designed plans arrive at an organisation's vision, mission, strategy and strategic objectives within the business environment in which it operates". Hence, strategic management and strategic thinking of managers are vital to promoting the linkages. It demands the leader's capacity to reconcile and co-ordinate both the internal and external contexts of the organisation to manage and take part in complex, and dynamic information processing (Jooste & Fourie, 2009: 52). As strategic management, educational institutions should be analysed and interpreted from the points of inputs, process and output, as well as from the perspectives of its efficiency, relevance, impact, effectiveness and sustainability (Chang, 2008: 2) (See also, systems theory section 2.7 and the conceptual framework of the study section 2.10).

In relation to this, leadership and management have a great impact on the development of institutions. Visionary leaders work beyond their organisation in creating a partnership with the external world. They set long-term strategic goals, fosters partnership and participate in collective decision-making activities with their stakeholders. However, many African institutions suffer from poor strategic planning, research management, market research and advocacy, financial planning and management, human resource management skills, properly designed performance management ability and networking and partnership building skills (Teshome, 2008: 10).

On the contrary, managing university-industry linkages (UIL) demand planning on strategic issues. It also requires organising of human, material, financial, time and information resources to strengthen the relationship. Planning is the primary activity of leaders/managers of the organisation. The term is liable to conceptual pluralism, and there are many definitions of planning. Despite this, Chang (2008: 2) states that planning is the process whereby a direction is set forth, and a mechanism for tracking those directions are clearly spelt out (Chang, 2008: 2). The author further explains plan is the result of the planning process and can be seen as a collection of decisions in relation to what is to be done, why and how to do it.

In view of this, leaders in different organisational structures of the university, industry and the government are required to give due attention to UIL. These partnerships are expected to be long ranging. As Edmondson, *et al.* (2012: 6) state, UIL should be established around common research vision, which may sustain for a decade or beyond, creating deep professional links, trust and shared advantages that strive to bridge the sharp cultural dichotomy between the university and the industry. Through time, a properly managed collaboration will come up with an increased number of professors and graduate students who can think and transcend this cultural divide, connect with key research areas of the industry and work harmoniously to clearly stipulate big and shared strategic goals (Edmondson, *et al.*, 2012: 7). Hence, managing UIL requires a well-thought leader who can set strategic partnership by envisioning the future, properly organise resources for linkage and focus on the key areas of partnership for the common goal of both the industry and the university.

3.7.3. Low student enrolment

Africa is the second most populous continent on this planet. Notwithstanding this, the scenario of the continent shows that student population decreases as one move up from primary to tertiary. Comparatively, in Sub-Saharan African countries, higher education enrolment rates are by far the lowest in the world (Bloom, Canning & Chan, 2006: 3). These writers further explained that enrolment growth rate has been relatively low in Sub- Saharan Africa, and the gap remained high leaving behind other regions. It is worth noting that the current enrolment rate of the region was in the same range as other developing nations 40 years ago (Bloom, *et al.*, 2006: 3). Furthermore,

the gender gap has been conventionally wide and remained so. As one moves up along the echelons of the education system, the gender gap between male and female is getting wider putting female at the disadvantaged position. This is true as there are limited numbers of female university professors in most of the African universities.

3.7.4. Curriculum irrelevance

Curriculum development is a dynamic process by its very nature. It should be designed in such a way that it meets the development needs of the society and go in line with the current technological advancement of the nation in particular and the world in general. However, in Africa, the teaching-learning process and the designed curriculum are out-dated and less relevant to the economic needs of the society (Teshome, 2008: 10). The practical teaching-learning process has got less emphasis and students have little exposure to enhance their technical competencies, have limited experiences in solving practical problems and have skill gaps in communication and management (Teshome, 2008: 10). This will result in high unemployment or underemploymentrates, as the graduates did not acquire necessary skills during their stay in the university.

However, researchers like Edmondson, *et al.* (2012: 13) contend that the major focus of most university-industry partnerships is joint research; many also have a great impact on the development of the teaching-learning process as the result of successful collaborations. They further add that university professors may join the project inside the industry and researchers may provide lecture, establishing a fruitful on-going exchange of ideas that may support to revise the curricula (Edmondson, *et al.*, 2012: 13).

Strong UIL will help universities to match their curricula with the needs of the industry. Curriculum development should involve members from the industry and other stakeholders as participation increases the relevance of the curricula. Moreover, it enables graduates to have easy access to the field of work. Universities serve as a platform to align the demand of the industry or the field of work and provide trained manpower with relevant training through its curricula; research and community

outreach services and make a meaningful contribution to the progress and development of a nation (Teshome, 2008: 8). However, there is a widespread debate on the relevance of the curricula, voiced aloud by the overall misalignment between the programmes offered at the university and their demand in the labour market (Teshome, 2008: 10). One can easily understand from this that many African universities are strongly criticised on the ground that their curriculum is lacking dynamism and failing to meet the growing demands of the industry.

3.7.5. Weak research output

As indicated in the first chapter of this thesis, universities are established for producing required manpower for the labour market, provide community service and conducting problem-solving researches. This is strengthened by strong university-industry linkages. In support of this, Tumuti, *et al.* (2013: 26) argues, "it's through such linkages that universities have grown to become catalysts for the growth of a nation for their roles are not only confined to human capital development, but also in technology transfer, research and development, and innovation". Similarly, Altbach (2011: 8) states that research universities did not only pledge to bring research to the centre of the academic discourse, but also to relate it to applied science and national development. Hence, there is widely held consensus among scholars that universities are in charge of conducting problem-solving researches that contribute to the development efforts of the society. In addition to this, they are expected to play their role in innovation, technology transfer and serve as the bridge to link with other parts of the globe.

Despite this fact, Africa's academic research output remains weak. In 1995, the region was only produced about 5,839 published academic papers where this number is by far below South East Asia and Latin America and the Caribbean, which was 15,995 and 14,426 respectively (Bloom*, et al.,* 2006: 4). This shows that how much the continent is lagging behind when compared to other parts of the world. Low research output is challenged by the low proportion of academic staff, which holds doctoral degrees (Ssebuwufu, *et al.,* 2012:13). This has also relation with the number of university-industry linkages created. On the contrary, lack of research infrastructure, including the absence of science parks and technology incubators, limited funds to

support the collaborations, shortage of qualified researchers and limited expertise in entrepreneurialism, IP rights and commercialising, are among the factors that significantly challenge African universities (SSebuwufu, *et al.,* 2012: 8). Strengthening this, Teshome (2008: 11) emphatically pointed out that the research capacity of African universities is challenged by limited funding influencing their competitiveness in knowledge production and adaptation as well as integration into the global knowledge society. These challenges have a multidimensional effect on the reputability of the universities and their roles to play in the world of academia. On the other hand, support for establishing and managing technology incubators and business parks would help directly react to the demands and priorities of African universities as they endeavour to build stronger linkages with the productive sector (Ssebuwufu*, et al.*, 2012:13).

3.7.6. Poor quality of graduates

There are various definitions of quality education. Different countries may view quality from their own perspectives and the purpose it is supposed to serve. Despite this, mostly quality is viewed as fitness for purpose. Nevertheless, the high unemployment and under-employment rates among graduates, coupled with low economic development in many African countries, are issues that African higher education leaders cannot afford to ignore and have therefore brought to the forefront that needs to revisit the interface between universities and the productive sectors of the economy (Ssebuwufu, *et al.,* 2012: 13). Other things being held constant, there is a positive relationship between quality of graduates and employment opportunities.

Emphatically, case study made on African universities pointed out that the training, skills and knowledge provided for students in African universities do not adequately prepare the learners to satisfy the demands of the industry and the job market. This misalignment between the needs of the industry and what students trained-coupled with inadequate training in vital skills of problem-solving, analytical thinking and communication- is criticised, partly for the emerging high graduate unemployment and underemployment in many African countries are experiencing (Ssebuwufu, *et al.,* 2012: 7). The types of skills required for graduates to join the job market need to be well recognised so that universities can fine-tune their training towards this end. Appropriateness of the programme delivered plays a crucial role in supporting their

graduates to find and broaden employment opportunities (UNESCO, 2012: 1). These problems are partly attributed to lack of practical works that the students receive at the university level. In addition to this, the ill fit of graduates to the demands of the economy and the labour market has created a huge unemployment rate in the continent. Considering these problems, many scholars suggest strengthening university-industry linkage as a panacea to solve the ills of both underemployment and unemployment.

As a result, many African universities have undertaken efforts to promote and institutionalise linkages with the productive sector via the incorporation of industry linkages into strategic plans and the creation of designated posts and offices. However, such offices operate on minimal budgets in many institutions and are not usually equipped with adequate expertise in intellectual property right management, entrepreneurialism, and marketing mechanisms (Ssebuwufu, *et al.,* 2012: 13).

3.8. BENEFITS OF UNIVERSITY-INDUSTRY LINKAGE

University-industry linkage has a multi-dimensional advantage in the development of a nation both locally and internationally. As put by Edmondson, *et al.* (2012: 6) when the industry and the academia are working together to push the knowledge frontiers forward, they become a powerful engine for innovation and economic growth. These partnerships are instrumental in increasing the capacity of the universities to produce high-quality research and promote the competitive ability of the industry globally (Tumuti, *et al.,* 2013: 26).

Synergies between higher education institutions and industries (and other players in the productive sector) can play unparalleled roles in obtaining and leveraging more resources for universities, in increasing innovation and technology transfer, and ascertaining that the graduates have the skills, and knowledge demanded to add value to the labour forceeffectively (Ssebuwufu*, et al.,* 2012: 8). It has to be noted that, synergies between industry and universities have enhanced as the academia strive to break the *ivory tower* mentality that prevails between them. Despite this, evolving partnerships between university and industry are not only based on the need to create closer links with the community, but also has been motivated, initially by economic,

political, and technological forces (Tumuti*, et al.*, 2013: 26). Accordingly, the following section briefly discusses the benefits of UIL in general.

3.8.1. Economic development

The conception that higher education institutions are seen as economic entities and behave as the engines of economic growth (Altbach, 2011: 7; Tumuti*, et al*., 2013: 26; Fountain*, et al.,* 2004: III) is often overlooked (Fountain, *et al.,* 2004: III). Conversely, universities as its primary role of human capital development, it is also broadly understood as an economic booster that can positively contribute to country's economic growth (Tumuti, *et al.,* 2013: 26). In relation to this, the importance of universities in economic development is indicated by UNESCO as follows:

(i) producing and accumulating human capital;
(ii) generating, disseminating, and applying knowledge; and
(iii) innovating and inventing new information and technology (UNESCO, 2012: 1).

As listed above, the roles of qualified and skilled graduates play in the socio-economic development of a nation cannot be undermined. Educated manpower is capable of adapting and inventing new technologies. Hence, they can easily be accustomed to the ever-changing technological advancements, which in turn help them to add value to the economic advancement of the society and the nation at large. As indicated by UNESCO (2012: 1) again, sustained human resource development and training are required as there is an accelerated shift to high technology industries and information technology economy. Consequently, relevant higher education training is vital for producing skilled and competent workforce. In addition to this, the more rapid transition of developing countries to higher levels of development and standards of living will be determined by the speed and the extent at which they are able to absorb, utilise and modify technologies developed mainly in advanced nations (Cloete, *et al.,* 2011: 3-4). This implies that many scholars see universities as playing a critical role in providing the knowledge required for development. In addition to this, research has proved the existence of a strong association between higher education participation rates and level of economic development (Cloete*, et al.,* 2011: 3).

Furthermore, the economic advantages of UIL can be viewed from the income generation for both the individual and the nation. It may create higher tax revenue for the government, enhance the opportunities for saving and investment, and pave the way for better entrepreneurial and civic society. It can also raise nation's health status, contributing to planned population growth, improve technology and broaden democratic governance (Bloom, *et al.,* 2006: 1). This is the intergenerational effect of education, specifically obtained from forging and strengthening such relationships.

Lastly, in relation to the advantages of higher education institutions to the country'seconomic development, many scholars attribute, for instance, India's leap onto the world economic stage as emerging from its decade-long triumphant endeavour to offer high quality, technically oriented tertiary education to its large number of citizens (Bloom, *et al.,* 2006: 1). Similarly, some developing nations and emerging economies have 'leap-frogged' level of development by investing a huge amount of resources in their higher education institutions (Cloete, *et al.,* 2011: 3-4). Therefore, it is well understood that universities play indelible roles in the economic development of a nation. This becomes true with forging and managing strong UIL.

3.8.2. Social and cultural development

In addition to their economic benefits, universities are the means for the socio-cultural development of a given nation. Social benefits obtained from universities consider a better quality of life for oneself and family, improved decision-making, promoted personal status, and opportunity for the individual; and better leadership, social advancement, greater integrity, and decreased crime prevalence (Teshome, 2008: 6). Universities play an irreplaceable role in transforming society through human capital development, research and innovation.

Universities also play a pivotal role in nation building by also preserving the cultural and social heritage of the society. A typical example of this is the ratification of the *Magna Charta of European Universities* signed by 430 European universities held in Bologna in 1988, which stated the role of universities is to produce and disseminate cultural values. The promulgation rectified universities as 'trustee of European humanist tradition' (Hrubos, 2010: 348). In addition to this, Brennan, King, and Lebeau

(2004: 36) argue that universities are suited in major cities, appear specifically to exert an important symbolic influence offering opportunities for the manifestation of national cultural values and traditions. They act as the repositories of traditional heritages, cultural values and belief systems of a given society.

In relation to this Altbach (2011: 6) indicates that universities are the repositories and organisers of knowledge. The writer further expands that academic libraries have been conventional centres for keeping and organising intellectual and cultural heritage of the society. Libraries are in charge of not only collecting books and journals (the basic sources of knowledge); they also co-ordinate scholarly and scientific research outputs of all kinds for better use and maintain it safely for the coming generations. Still more, universities play a great role in publicising indigenous knowledge to the other parts of the world through research and innovation.

Universities also maintain other scientific and cultural artefacts, varying from artwork to assemblage of insects. Academic institutions usually sponsor museums and make accessible to broad audiences (Altbach, 2011: 6).

Universities have been found to be an important bridge through which formerly isolated societies have become visible to the external world (Brennan*, et al.,* 2004: 37). In fact, professors in the universities are the largest community of experts in any society and may play a vital role by elucidating science and scholarship for the larger beneficiaries. They sometimes also bring their esteemed expertise directly to the government by serving as ministers or taking other similar positions. They sometimes strive for public office. They often participate in oppositional politics by providing ideas or analysis and sometimes by directly engaging in political activism (Altbach, 2011: 7). By providing staff and student mobility, universities also arrange conditions for multinational networks, cultural exchange and experience sharing (Brennan*, et al.,* 2004: 37).

Academic institutions offer education and training required for more skilled jobs and professions in the community. Nearly for a century, universities have also been viewed as an essential instrument for social advancement - a mechanism for people to gain skills they need to increase their incomes and status (Altbach, 2011: 7). However, it should not be surpassed that conflict usually prevails between the impacts of

internationalisation and the desire to keep and promote national identity (Brennan, *et al.,* 2004: 37). Despite these arguments, universities are centres for the cultural development of nations. They serve as a bridge to connect with other parts of the world. This is enhanced by the UIL, which may pave the way for conducting research to make use of indigenous knowledge and cultural exchange.

3.8.3. Technology transfer

Nowadays, how to ensure the wealth of knowledge produced by universities be disseminated to the industry has become the major concern of policy makers so that the society in general, and the local firms in particular, could get the maximum benefit from the university's scientific and technological expertise (Nyerere, 2013: 2). This is the idea that bridges university with the industry.

Since the proclamation of the Bayh-Dole Act of 1980, academic institutions have profoundly participated in technology transfer (Bradley, Hayter, & Link, 2013: 3). The enactment gave full authority to universities and other public research institutions to exploit innovations produced with the help of federal funds (Vielba & Esquinas, 2011: 240). In fact, this is called the third academic revolution in literature.

Commercialisation of university-invented technologies are the engines of economic growth and universities have played a crucial role in contributing innovative ideas and inventions to the commercial market (Bradley, Hayter & Link, 2013: 3). The commercialisation of these technologies got attention from the government and universities for different reasons, which can be seen at various levels. In relation to this, Vielba & Esquinas (2011: 240) note that the analysis could be done at macro, meso and micro levels. The macro level impacts drive from policy-related issues like patent regulations as well as the proportion of certain successfully commercialised technologies. Meso level impacts are related to organisational dynamism that supports the growth of technology transfer offices. At last, micro level advantages are the strategies that permit individual researchers to get incentives and rewards associated with IPR activities. They also argue that all these inputs together provide positive feedback within the whole process and help to expand it, consequently, adding value to its long-term growth.

University-industry collaboration is vital for bringing long-lasting economic development in a nation. Moreover, such partnerships are the means for promoting the capacity of academic institutions to conduct high quality and problem-solving research that enhances the capacity of the industry to compete globally (Tumuti, *et al.,* 2013: 27). University-industry collaboration is the top priority for esteemed world-class universities. The benefit is bi-directional for both the industries and the universities. A significant flow of funds, increased opportunities for university professors and graduates to conduct ground-breaking research, vital inputs to sustain the teaching and learning on the cutting edge of the discipline, and the effect of providing solutions to the pressing global problems (Edmondson, *et al.,* 2012: 6). This will enhance mutual benefits for both parties, which will consequently lead to improved economic growth. However, policies related to research and development should be directed towards linking universities more strongly to the economic development, and the real management of academic institutions have favoured certain strategies, particularly those associated with the utilisation of IPR such as licences, patents and certain spin-offs transactions (Vielba & Esquinas, 2011: 240).

3.9. OVERVIEW OF THE ETHIOPIAN CONTEXT

Analysing the context of the country is crucial to recognise the background of the problem. The political system of the country and its socio-economic environment will have an impact on the proper functioning of UIL. Moreover, the kind, type and capacity of industries will have significant influences on fostering relationships. On the other hand, the level at which the education system is expanding, especially, at higher education level calls for better collaboration than ever. Therefore, the following section overviews the Ethiopian context in which the UIL is operating briefly.

3.9.1. The political environment

Prior to 1991, Ethiopia had a long history of the centralised political system. Following the change of government, the shift was made from strong centralised system to decentralised system, which was reflected in the constitution. The constitution established federal and ‘democratic’ state structure (TGE, 1994a: 1; Tegene, 1998: 33; World Bank, 2005: 4; MoE, 2010b: 8; Oulai, Lugaz, Minas, & Teklehaimanot, 2011:

14). Article (1) of the constitution states the country as 'Federal Democratic Republic of Ethiopia'. The Constitution allows the shift from the long-held tradition of a centralised system to the decentralised system following the overthrow of the military government regime. In favour of this, the government introduced a dynamic reform structure to substitute the long tradition of the centralised power system of the communist regime with the federal structure in which regional and sub-regional governments play direct and sustentative roles in country's decision-making activities (World Bank, 2005: 1).

Accordingly, the constitution established nine member states of the federal government with relatively 'autonomous' power in that they elected bodies and have the power to make legislation and policy decisions regarding many activities (Tagene, 1998: 38; TGE, 1994a: 16). There are activities concurrently executed by the federal government and regional states. Despite this, as it is stipulated in Article (52) of the Constitution, they are responsible for self-government, enact and execute the Constitution, administer land, levy and collect taxes, and establishing state police force so as to maintain peace and order within the state (TGE, 1994a: 19). The overall attempt of the constitution is to promote a decentralised system within the country. This is due to the strong belief that decentralisation of decision-making makes decision relevant to the local needs and conditions; encourages commitment from the local people; achieves speed and flexibility; promotes local participation and puts the higher responsibility on the local leaders at the grass root levels (Tegene, 1998; 36). Its decentralisation guaranteed all regions with the autonomy supported by financial decentralisation, which pushes down the decision-making authority to lower levels of the government structure (MoE, 2010: 10).

3.9.2. Socio-economic context

Ethiopia is a landlocked country. Situated in the Horn of Africa, Ethiopia shares a border with Eritrea, Djibouti, Somalia, Kenya and Sudan (UNDESA, 2010: 1). It has a total land area of 1, 251, 282 square kilometres, consisting of a central high land mass encircled by lowlands (Ahmed, *et al.,* 2001: 3). It is the seventh largest country in Africa (MoE, 2010: 10). In this area, Ethiopia is twice the size of France and slightly less than twice the size of the state of Texas (World Bank, 2005: 3). Climatically, the country

has very attractive temperate climate in its highland areas, and tropical in the lowlands with rainy seasons ranging from the middle of June to the mid of September. It is not only featured by extreme geographic variations but also elevations ranging from 100m below sea level (Kabar sink in Dallol region) to 4,620m above sea level (Ras Dashen mountain) (World Bank, 2005: 3).

Although the country lacks a sea outlet in the Horn of Africa, Ethiopia has one of the most potential water reserved countries in the continent due to its 14 rivers that run throughout the country. However, only small percentage, that is, nearly 2.5 percent of this large amount of available water resource is being utilised for hydroelectric power and irrigation (RAD, 2012: 1).Cognisant of this huge potential, the government is currently undertaking several dam constructions including the Grand Ethiopian Renaissance Dam underway on the Abay River.

Following Nigeria, Ethiopia is the second most populous Sub-Saharan African country (UNDESA, 2010: 1; Nganwa, 2013: 5; Alemayehu & Yihunie, 2014: 2). It is a country with ethnic and cultural diversity with greater than 100 nations and nationalities speaking more than 100 languages and dialects (Ahmed, *et al.,* 2001: 3; World Bank, 2005: 3). With the projected total population of 104,957,000 in 2017 (UNDESA, 2017: 18), Ethiopia's population is one of the fastest growing in the world (World Bank, 2005: 4) at 2.6 percent per annum (Alemayehu & Yihunie, 2014: 2). However, recent data on population growth shows that there is a declining trend. Some 80 percent of the population is located in the three largest regional states: Oromia, Amhara and Southern Nations and Nationalities and Peoples (SNNP) regions. The lowest proportion of the population is in the Harari Regional State (Nganwa, 2013: 5; World Bank, 2005: 3). The vast majority of the Ethiopian population is living in rural areas (Martins, 2014: 11). Women account for approximately half of the total population. The growth of urban population is at 4.9 percent per annum, whereas 2.2 percent for the rural. In 2011, approximately 17.6 percent of the total population resided in urban areas (Nganwa, 2013: 5; Martins, 2014: 11). In terms of age, Ethiopia has a very young population, below 25 years of age consisting of about 65 percent of the whole population (Martins, 2014: 11).

Agriculture is one of the major contributors and taking the lion's share of the economic activity of the country (MoE, 2010: 10; Nganwa, 2013: 19). It accounts for approximately 80 percent of the labour force (Nganwa, 2013: 19; Saint, 2004: 83), with over 74 percent of the total female population and 83 percent of the entire male population in the sector (Nganwa, 2013: 190). Agriculture in Ethiopia consists mainly of subsistence farming, made up of low input, low output rain-fed systems (Nganwa, 2013: 19; Saint, 2004: 83). Sector-wise, Agriculture, industry, and service contribute 48, 14, and 38 percent for GDP respectively (Joshi & Verspoor, 2013: 3). In terms of export, it accounts for 90 percent (Nganwa, 2013: 19). It also constitutes the largest share of the Gross Domestic Product (GDP) of the country. Principal export products include coffee, beans, cereals, potatoes, sugarcane, vegetables and livestock, which account for approximately 15 percent of GDP (RAD, 2012: 1). Khat, gold, leather products and flower exports are also the other exports that can contribute to the economy of the country.

Despite this, the contribution of Agriculture to GDP has fluctuated over the years. The most recent decrease was a drastic decline from 50.8 percent in 2009 to 41.9 percent in 2011. Reduction in the Agriculture's share of GDP may be due to growth in other sectors, specifically industry and services. The sector's annual growth rate increased from 1.8 percentin 2002 and -10.9 in 2003 to 16.9 percent in 2004 after which it gradually declined to 6.4 percent in 2011 (Nganwa, 2013: 19).

In terms of human development index (HDI), Ethiopia is ranking among the least in the world (UNDP, 2013: 2). HDI considers three dimensions of human development: a long and healthy life, access to education and a decent standard of living. According to the report of UNDP, again Ethiopia's HDI value for 2012 is 0.396 in low human development category ranking the country at 173 out of 187 countries and territories. It further explains that, between 2000 and 2012, Ethiopia's HDI value raised from 0.275 to 0.396, a growth of 44 percent or anaverage annual increase of 3.1 percent. Comparatively, Ethiopia's 2012 HDI of 0.396 is below the average of 0.466 for countries in the human development group and below the average of 0.475 for countries in Sub-Saharan Africa UNDP (2013: 3).

Multidimensional Poverty Index (MPI), which includes various deprivations in given households in education, health and standard of living, is 87.3 percent in Ethiopia (the MPI 'headcount') while an additional 6.8 percent were susceptible to such deprivations (UNDP, 2013: 4). The nation's MPI value, which is the proportion of the population that is multi-dimensionally poor, adjusted by the strength of the deprivations, was 0.564 where it is 0.35 and 0.367 for Rwanda and Uganda respectively (UNDP, 2013: 4). Hence, the expansion of the education at all tiers of the system is important as the country planned to be a middle-income country by 2025. However, this has to be well noted that it should not be at the expense of quality.

3.9.3. The industry sector

Operationally, the term industry includes both the manufacturing and the service sectors (refer to chapter one). It also includes primary sectors like agriculture, mining and fishing. The recent situation of Ethiopia shows, the industry sector is one of the growing sectors after the change of the military government. As witnessed by Geiger and Moller (2015: 24) currently the industrial sector was the rapidly growing sector, stimulated by a construction explosion and increase in the mining sub-sector. They further explain that the growth rate of the industry was 18.5 percent in 2013/14. In Ethiopia as this sector is at its early stage of development, it is mainly concerned with the production and processing of primary products dominated by food, leather, beverages, textiles, and apparel industries, contributing only a meagre 4.4 percent to GDP in 2014 and on average increase by 11 percent during the same period (Geiger & Moller, 2015: 24)

Geographically, the industry sector is mainly concentrated at Adds Ababa and its vicinity as there is better infrastructure and market exposure when compared to others. In addition to this, there is a tendency to expand to some regional cities like Adama, Hawassa, Mekelle, Bahir Dar, Dire Dawa and Harar. Despite all this, industries in Ethiopia are small in size, with limited employment opportunity and limited to production and processing of primary products.

3.9.4. Overview of the education sector

3.9.4.1. Primary education

After the change of government in 1991 and the overall shift of policies in all aspects, a holistic education and training policy (ETP) was proclaimed (Ayenachew, 2014, 24). Prior to 1991, the Ethiopian education system was criticised for its low quality and relevance, low access, inefficient and lack of equity. Cognisant of this, the current education and training policy tried to address these issues. Major changes in terms of the education structure, medium of instruction, financing system, its management, curriculum and teachers' training took place (TGE, 1994b: 4).

Article (3.2.2) of the policy indicates that primary education will be eight years duration, providing basic and general primary education to get ready students for further general education and training (TGE, 1994b: 17). It focuses on numeracy, literacy, agriculture, environment, crafts, home science, health services and civics (TGE, 1994b: 18).Its objective is to acquaint students with the basic skills of language, arithmetic, natural conservation and sanitation. At this level, it tries to address basic issues related to the life of the individual and helps them to interact smoothly within the community by applying those basic skills.

The policy also emphasised (Article, 3.5.1) the importance of child's first language as a medium of instruction because of its pedagogical advantage also as a matter of nations and nationalities' right to promote their culture and identity (TGE, 1994b: 26).

With its structure (see Figure 3.1), the current education and training policy (ETP) took a major initiative to change from 6-2-4 structure of the military government and its predecessor to 8-2-2 structure implying eight years of primary education, two years of general secondary and two years of the second cycle secondary/preparatory school. The primary education is divided into two separate cycles - the first cycle contains grades 1-4 while the second one contains 5-8.

At the end of primary school, students take primary school leaving certificate examination (PSLCE). Based on their achievements, students join general secondary

schools for two years. At the end of grade 10, they take general secondary school leaving certificate examination in which they either join preparatory schools (11 & 12) or attend Technical vocational education and training. As indicated in Figure 3.1, the TVET has five levels in which the trainees proceed from one level to the other based on their competence and interest. The structure allows other students to join universities based on the results of the entrance exam. The undergraduate level may take 3-6 years while the graduate studies take 2 and 4 years for masters and PhD programmes respectively.

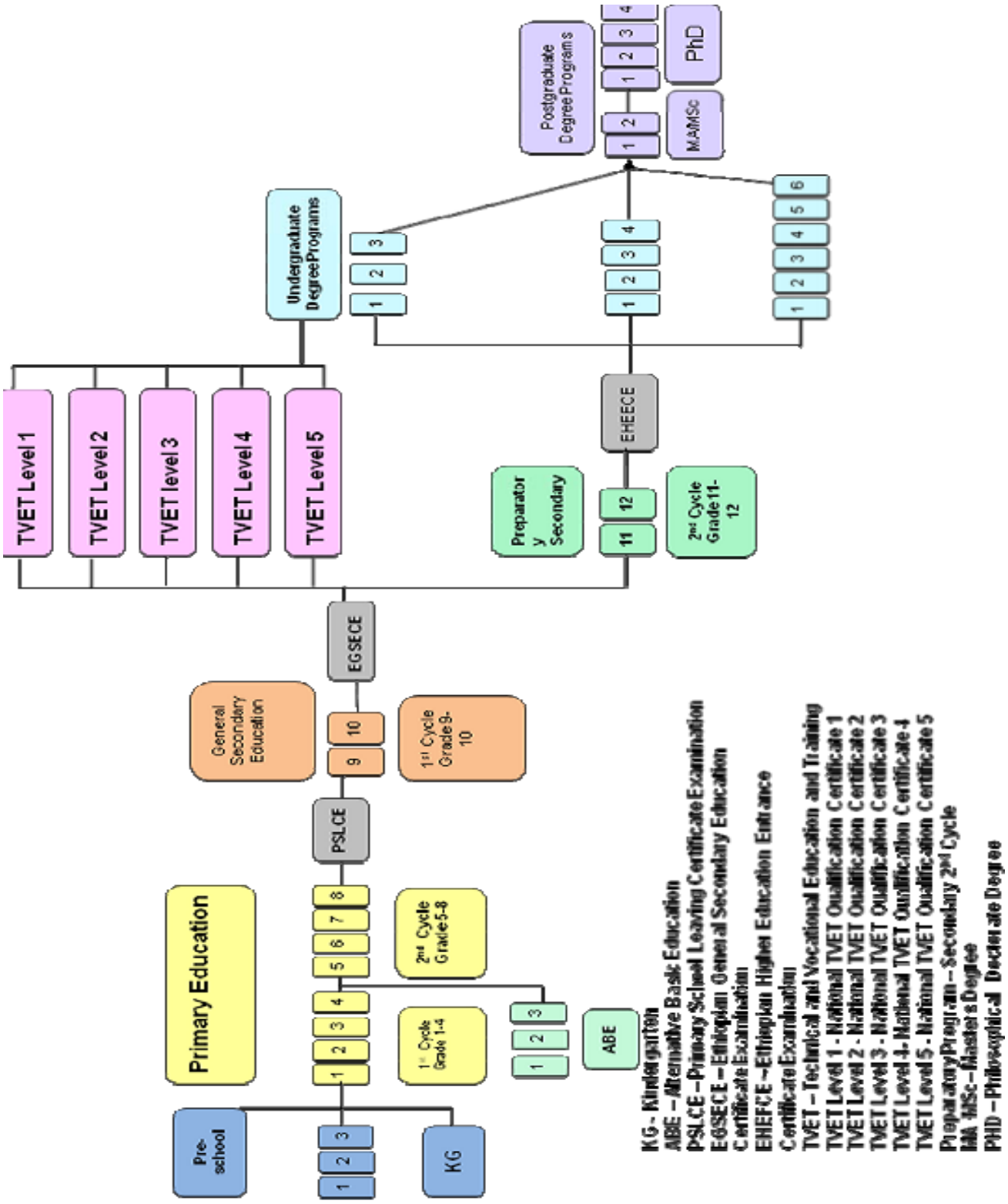

Figure 3.1: Structure of the Ethiopian education system (MoE, 2013: 4; 2015: 3)

After the implementation of the Education and Training Policy of 1994, considerable achievements have been observed in the last couple of decades. Despite several

problems related to quality, the Net Enrolment Rate (NER) showed a dramatic change from below 22 percent at the downfall of the military government (TGE, 1994b: 3) to 92.6 percent in the academic year 2014.

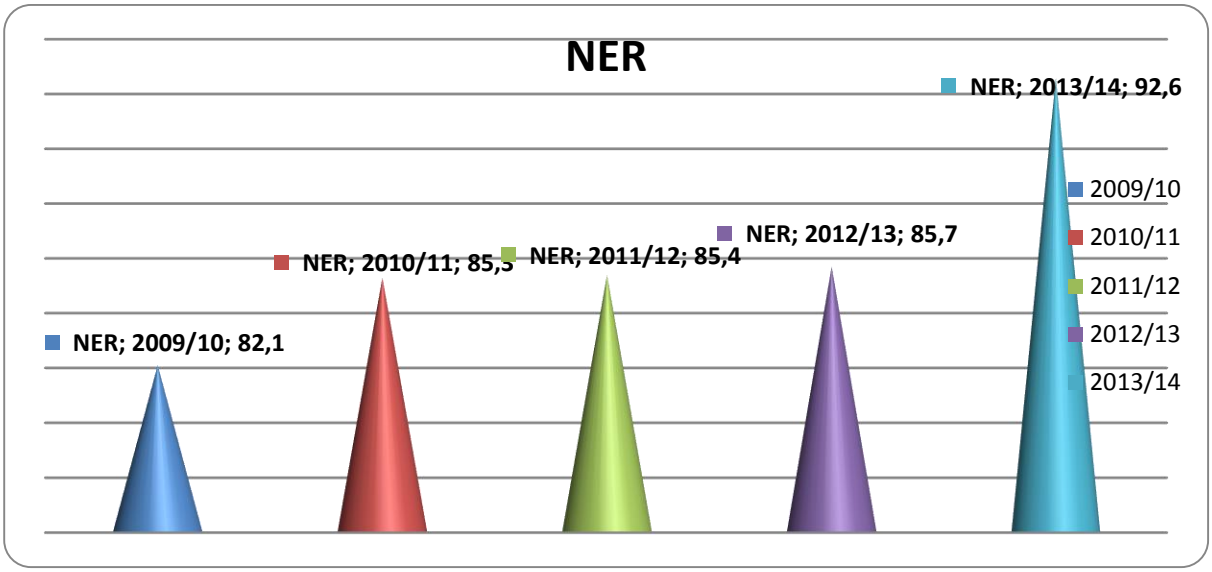

Figure 3.2: Growth trend in Net Enrolment Rate at primary level in the past five years (MoE, 2015:31; 2013: 27)

Another important achievement of the education sector is the reduction of the gender gap between boys and girls. Gender parity index (GPI) which considers the ratio of girls' gross enrolment to the boys' gross enrolment ratio for all levels of the education system, is the most widely used indicator to maintain gender equity and to increase participation and enrolment to the system (MoE, 2015: 33). It is 0.93 (MoE, 2015: 33) in Ethiopia at the primary level. The gender parity index of '1' shows greater equality, whereas '0' shows the highest inequality along the continuum.

3.9.4.2. Secondary education

As indicated above, the structure of secondary education in Ethiopia is two years of general secondary (9-10) and two years of preparatory schooling (11-12) (MoE, 2015: 47). The policy states that (Article, 3.2.3) secondary education will take four years of study divided into two cycles: General secondary education and preparatory education. The former will enable students to identify their area of interest for their

further education, for the specific training and prepares them for the world of work. It is completed at the end of grade 10 with national exams. On the other hand, the second cycle of secondary education and training will enable students to join subjects or areas of training which will prepare them adequately for higher education institutions and the labour market (TGE, 1994b: 18). After completing General Secondary Schools (Grade 10), students will choose either to enter the preparatory schools based on their results of the Ethiopian General Secondary School Certificate Exams (EGSSCE) or to join TVET institution, which has different levels.

Expansion of secondary schools also takes similar pattern with primary schools. The number of secondary schools in the country increased from 1,335 in 2010 to 2,333 in 2014 with an average annual increase of 11.8 percent in five years (MoE, 2015: 13). Gross enrolment rate (GER) at first cycle primary school was 39.1 percent and showed slight improvements after five years and reached 39.3 percent. In the second cycle of secondary, the GER increased from 7 percent to 10 percent in the year 2014 (MoE, 2015: 47). The Gender Parity Index (GPI) at secondary school has also shown improvements from 0.8 to 0.94 in first cycle secondary and from 0.57 to 0.85 in the second-cycle secondary from 2010 to 2014 (MoE, 2015: 53).

3.9.4.3. Technical and vocational education and training (TVET)

Another special emphasis given by the government in ETP (Article, 3.6.5) is the inclusion of technical and vocational education and training (TVET) (TGE, 1994b: 26). To remain competitive in the global market, production of skilled middle-level manpower is essential. Accordingly, the training aim of TVET was to produce skilled, competent and self-reliant citizens who can positively contribute to the social and economic development of the country, thus, increasing the livelihood of all Ethiopians and reducing poverty on a sustainable basis (ECBP, 2012: 1). This, in turn, demands technically and professionally trained individuals in the “ability to learn” and in certain specified occupations. Therefore, technical vocation education and training (TVET) are usually seen as the centre of education targeted at commercialised and entrepreneurial skills. Ethiopia is implementing, partly through TVET, a holistic human resource development programmes. TVET offers training on the market-driven programmes based on the needs of the industry for different target groups like

graduates of grade 10 and early school leavers, employed individuals and marginalised groups in the labour market (MoE, 2015: 67).

The plan for accelerated and sustained development to end poverty (PASDEP), Ethiopia's second poverty reduction strategy paper, states that in order to achieve the development targets, TVET will need to offer "relevant and demand-driven education and training that relates to the demands of the economic and social sectors for employment and self-employment" (Krishnan & Shaorshadze, 2013: 10). In addition to this, TVET is taken as a strategy to achieve the country's Growth and Transformation Plans I (2010/11-2014/15) and II (2015/16-20/21). It is believed that TVET will contribute to making the country a middle-level income country by 2025 (Krishnan & Shaorshadze, 2013: 10).

In sum, in the education structure of Ethiopia, TVET is also included as it aims to contribute to the development of the country by producing technically skilled workers that the labour market demands. Students mainly join after they are certified with the general secondary school leaving examination results. At the same time, it aims to fill the gap that modern industry needs and increase the entrepreneurial capacity of the employees. Despite this, this study aims to address university-industry linkage in the context of universities, which will be treated hereunder.

3.9.4.4. Higher education

Although Higher Education in Ethiopia possesses a 1,700-year tradition of elite education linked to its orthodox church (World Bank, 2003: 7; Saint, 2004: 1), higher education in its modern and secular context has a history of little more than sixty years (Woldegiyorgis, 2014: 24). Secular higher education was initiated only in 1950 with the founding of the university college of Addis Ababa (World Bank, 2003: 7; Amare, 2005: 2; Solomon, 2010: 96). However, Ethiopia has a well-established form of traditional higher education, which is mainly based on Quranic and church schools (Amare, 2005: 5).

Before the 1990s, the system of education was small sized, influenced largely by the socialist ideology and quite dormant particularly at tertiary level (World Bank, 2003:

14). As argued by World Bank (2003: 7) and (Saint, 2004: 2) higher education system in Ethiopia found itself as conservative in its intellectual orientation, regimented in its management, limited academic and intellectual autonomy, serious shortage of experienced professors among the academic staff, deteriorating academic quality, meagre research output and almost alienated from the intellectual currents of the global higher education community. This implies that the management of universities was highly centralised, with little participation of the stakeholders in the university affairs, with less involvement in research and outreach services. This hampers the roles universities could play in the development of the society, which, consequently will, result in poor university-industry linkage. As indicated by Saint (2004: 2) three notable outcomes ensued over during 'Derg' (literarily a socialist military junta who replaced the monarchical regime of Emperor Haile Selassie in 1974), "intellectual life atrophied on campuses, academic brain drain soared, and the country's education system became largely isolated from the western world".

Cognisant of these bottlenecks, Ethiopia took a major initiative to solve deep-rooted societal problems through education, especially higher education. Starting from that time onwards, continuous changes have been made especially in higher education landscapes (Ayenachew, 2014: 24). Ambitious efforts have been made to re-align its higher education system to contribute more openly to the national strategy for economic growth and poverty reduction through competent manpower production and technology transfer (World Bank, 2003: 7). The report of the bank reveals that the reforms have focused in all tiers: the entire system, the institution and the academic programmes (World Bank, 2003: 7; Saint, 2004: 2).

Higher education reform takes expansion as its major concern at the system level. After the privatisation of the economy, various public and private higher institutions were established in place of the previous two universities (Saint, 2004: 3) before the downfall of the military government regime. Currently, there are 44 government-universities (though, they were 31 at the time of data collection for this study) and 64 accredited private higher institutions hosting 511,732 and 80,758 students respectively (MoE, 2015: 167). A huge change is observed in less than a couple of decades which was 43, 843 in 1997/98 (Saint, 2004: 3) to 592,490 in 2013/14 (MoE, 2015: 167). This is an increase of more than thirteen-fold in seventeen years. In

addition to this, the share of the private higher institution becomes about 16 percent of the entire education participation.

At the institution level, the reform began with the ratification of higher education proclamation by the parliament (Proclamation No. 351/2003) and the next, (Proclamation No. 650/2009). In its introductory part, the latter proclamation states the legal ground for universities to play their part in the development of the country through capacity building, provision of quality education and research to contribute to the development and so as to create a sense of accountability to the public (FDRE, 2009: 1). With reference to the mission of the universities, Article 4(2) states the objective of higher education is to enhance and promote research emphasising on knowledge production and technology transfer that satisfies the country's priority needs (FDRE, 2009: 4).

In line with this**,** the government of Ethiopia places higher education institutions at the vortex of its development strategy for social and economic growth (Ashccroft *&* Rayner, 2011: 1). As a result, several reforms were taken by the government in the past couple of decades. These reforms include expansion of universities, privatisation, the introduction of cost-sharing, institutional autonomy and addressing quality issues are the major ones. The following sub-sections dwell on these reforms.

(i) Expansion

One of the major reforms taken in the Ethiopian higher education was the expansion of universities in different parts of the country (Solomon, 2010: 96). Many universities were established in the country at different times, usually divided into generations. As it is indicated in chapter one and at the beginning of this chapter currently there are 31 (at the time of data collection for this study, though it is now 44) government universities. As the part of this expansion, 8, 13, and 10 universities are categorised into first, second, and third generation respectively. Some of the previous colleges under the management of Addis Ababa University were promoted to full-fledged and autonomous universities, and other new universities were also established (Solomon, 2010: 96).This is due to the strong belief that universities through the production of skilled manpower, conducting ground-breaking research and technology transfer bring

change in the overall development of the country. Beyond this, fair distribution of universities is assumed to bring equitable access to universities and do their level best to contribute to the cultural development of different localities.

Despite expansion both in terms of physical construction and increased in the number of enrolments, there is a strong argument on the quality of education provided; research outputs produced and efforts made in strengthening university-industry linkage. As put by Reisberg and Rumbley (2011: 1), “the government has expanded the higher education system while growing enrolment, both at breakneck speed.”

(ii) Privatisation

Privatisation entails the application of market principles to the private sector in the functioning and management of higher education while retaining the ownership in the hands of the public domain. On the other hand, the private sector shows the growth of the non-state sector in higher education institutions (Varghese, 2004: 6). Until recently, providing higher education was almost monopolised by public universities in Africa (Varghese, 2004: 4). The writer further argues that the reliance of the state on the market-driven forces for development, with the weakening of centrally planned economies, the financial incapability of the governments to sufficiently afford education motivated the privatisation of higher education (Varghese, 2004: 6). Concomitant with this global pressure, privatisation of education was also introduced into the education system of Ethiopia since 1991.

The policy of the country (Article, 3.6.4 & 3.9.6) guaranteed autonomy to establish training programmes for both the government and NGOs (TGE, 1994b: 26). Accordingly, many private institutions were established in different education echelons. In fact, this was one major step forward in comparison with the previous governments, who tightly controlled the education system under the highly centralised system. Despite its criticism, especially in relation to quality, privatisation has brought significant results, at least in quantitative measures (Ayenachew, 2014: 25; Solomon, 2010: 97)**.**

Currently, out of the total 533,848 higher education (HE) undergraduate enrolments of the country, 79,650 (14.4%) of the students are enrolled in private HE (MoE, 2015: 71). Moreover, 64 accredited Private HE are providing education and training for their students in various disciplines**.** What makes special in private HEIs is, female enrolments in private institutions are greater than the enrolments of the government universities. It is 42.6 percent for non-government, whereas it is 28.1 for the government (MoE, 2015: 70). Despite several efforts, this remains a big rift in public universities of Ethiopia both as instructors and even in undergraduate enrolments.

(iii) Cost sharing

The market-driven reforms introduced under structural adjustment programmes, the decentralisation policies, and the financial crisis of the governments laid a fertile ground for the establishment of the private higher education in Africa (Varghese, 2004: 4). Especially the financial crisis aspect urged different countries to look for various mechanisms to cover the rising costs of higher education. The incompatibility of demand and supply of education raised the issues of different paying modalities by the governments of developing countries. Consequently, the cost-sharing mechanism was introduced as means to overcome financial constraints, in which Ethiopia was not an exception. In fact, this was with the push of international trends and World Banks influence to offset the financial crises (Ayenachew, 2014: 94).

The ETP in Article 3.9.1 officially declared the commencement of cost-sharing of graduates as the priority of the government is the provision of financial support for primary and general secondary school until the completion Grade 10 (TGE, 1994b: 31). Cost-sharing is the mechanism by which all the service recipients of public higher education institutions and the state share the cost incurred for the rationale of receiving education and related services (FDRE, 2003a: 2336). The policy also explains the arrangement of mechanisms for the graduates to cover their expenses after graduation- graduate tax, the provision of special support for outstanding students, for those who are deprived of educational opportunities, and women. The government also gave the introduction of cost-sharing to the education system through proclamation No.90/2003 by the councils of ministers. Under this proclamation article 4(1) reads:

> *All beneficiaries of public institutions of higher learning shall share full costs related to boarding and lodging and a minimum 15 percent of tuition-related costs. The amount to be shared shall be calculated based on the cost to be incurred at each institution and programme of study and shall be revealed to the beneficiaries at the beginning of each academic year (FDRE, 2003a: 2336)*

In addition to this, the proclamation urges the beneficiaries to enter a written contractual agreement with their respective institutions, revision of the cost per three years and only entitles the Ethiopian nationals to share the cost in the form of graduate tax. However, there are several challenges in managing the cost sharing in the actual field.

(iv) Financial autonomy

The quality of education, research outputs and services provided to the community partly depends on the amount of finance provided to higher education. In addition to this, the creation of university-industry partnerships for the establishment of joint research centres, technology transfers and science parks requires great commitment from the government and other stakeholders like industries as it incurs a huge amount of resources.

In relation to this, the Ethiopian government took several initiatives to expand higher education so as to solve the deep-rooted societal problems through research and community services (TGE, 1994b: 25-27). The ETP of Ethiopia gave due emphasis to the expansion of higher education. Besides this, two successive higher education proclamations gave universities legal ground to manage their financial resources allocated to them with full autonomy. The recent proclamation No. 650/2009, article 8 (6) allows universities to prepare and implement institutional plans, budget and organisational structure, and submit performance reports in accordance with the proclamation (EFDR, 2009: 4982). Universities receive their future recurrent budget in the form of block grants as clearly indicated on the basis of funding formula (World Bank, 2003: 7).

Moreover, proclamation No. 350/2003 urges any higher education institution to allocate an adequate amount of funds for research and study it conducts and utilise for the intended purposes alone (EFDR, 2003: 2239). However, the term sufficient is liable to various interpretations. By strengthening this idea again, proclamation No 650/2009 emphatically urges universities to create relationships with industries and other organisations in order to achieve its mission (EFDR, 2009: 4982). Despite this, the proportion of higher education from the education sector has shown slight improvement when one compares it with the other levels of education. Similarly, as most of the universities are under construction, they assign a greater amount of money to buildings and fulfilling infrastructures at the expense of research and other outreach missions of the university. Hence, it may have impacts on the university-industry linkage. The following figure shows the total amount of budget allocated at the federal level, the share of the education sector and the HE.

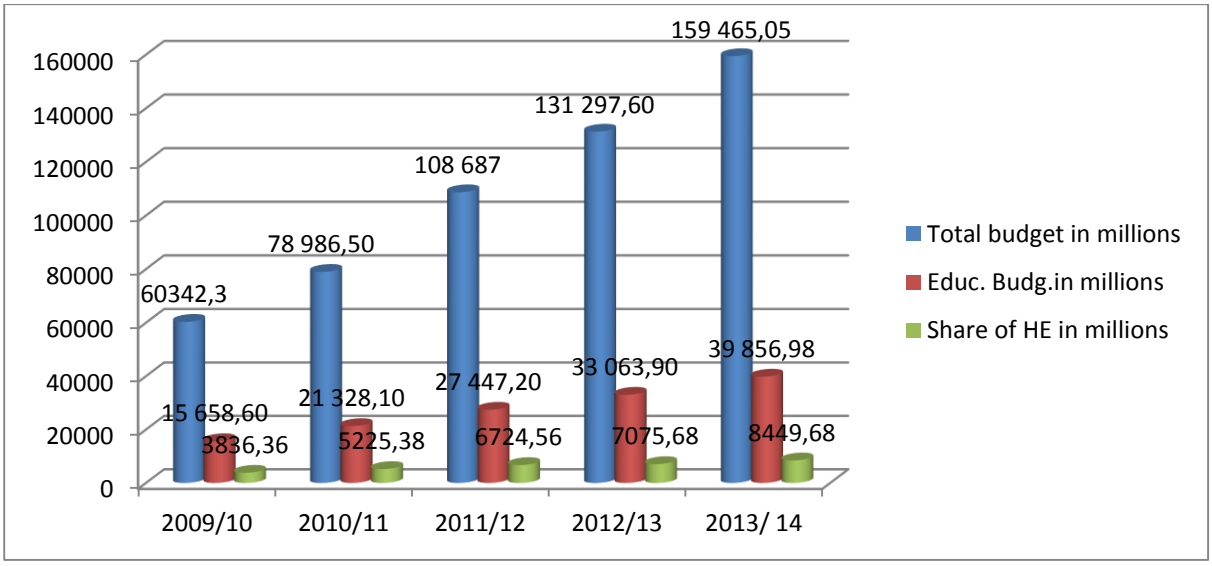

Figure 3.3: Share of higher educational budget as compared to total education budget (MoE, 2015: 6&17; 2014: 17&6; 2013:6; 2012:6; 2011:6 & 2010:6)

As depicted in figure 3.3 above, the share of education sector grew slightly over the past five years (2010/11-2014/15) by more than 20 percent per year. However, there is a decreasing trend in the proportion of the budget allocated for the sector as it was about 36 percent in 2010/11 to 2012 and about 20 percent increase in 2013/14. Similarly, the share of higher education remained almost the same in terms of

proportion when compared with the budget allocated for the education sector. It is almost greater than 21 percent in all years despite enrolment increase of students to higher education. This will bring thin distribution of allocated budget for different programmes in the university, which will consequently lead to university-industry linkage at stake.

3.10. CONCLUSION

This chapter tried to review the concepts of UIL, the rationale for UIL and its historical development. University-industry linkage (UIL) is conceptualised from the roles of the government, university and industry in working collaborativelyso as to increase competitiveness globally. Their interaction in a symbiotic manner will bring economic development through knowledge production and technology transfer. In addition to this, the rationales for UIL are the pressing global challenges that necessitate interaction and collaboration mandatory. The swift change in science and technology, increased global competitiveness and the demand for the knowledge-intensive economy than labour economy again calls for strong UIL. Hence, UIL is justified on these grounds.

This chapter also addressed historical perspectives of UIL in terms of revolution. The first academic revolution, which dates back to 19thc, focused on the integration of research into the teaching mission while the second was integrating UIL with the production centres (industry). The third academic revolution is about commercialising research outputs to the external world through patenting. The issue of technology transfer has got more sound than ever. In addition to this, the world is experiencing rapid enrolment growth in higher education and greater student mobility across the globe, which in turn calls for strong global partnership internationally than ever.

In relation to UIL, experiences of developed countries were also briefly reviewed. The United States of America had a long tradition of university-industry linkage. Its policy frameworks and practices were treated under this chapter. In addition to this, experiences from the world's fastest-growing economies like China and Japan in terms of their university-industry linkage was highlighted. They decentralised the organisation of the universities to the regional level and gave them full autonomy to

participate in technology transfer. Their universities have played a great role in boosting their economic development. Finally, from Europe, experiences of the United Kingdom were considered as it also contributed a significant amount of scientific research outputs for the world.

Considering Africa, experiences of South Africa, Egypt, Nigeria and Kenya were also considered briefly fora better understanding of the study context. These countries have relatively fertile ground for UIL from which experiences can be drawn. They were the leading countries from their respective regions in terms of world intellectual property right ranking.

Africa is also experiencing rapid student enrolment growth in the last couple of decades. However, African universities are challenged by lack of supportive policy environment, poor leadership and management, low research output, low student enrolment rates, irrelevant curricula and poor quality graduates. Still more, there are serious problems with physical infrastructure, brain drain, shortage of PhD holders and low retention rates are the bottlenecks that the African universities entangled with.

Despite these challenges, African universities are contributing to the economic and socio-cultural development of the nation. A bulk of literature supports the economic importance of university-industry linkage. It is also a means of promoting socio-cultural values of the nation. Through technology transfer, UIL also fosters innovativeness and global competitiveness.

Research resides in certain contexts. In relation to this, the political and socio-economic contexts of Ethiopia are addressed. Politically, Ethiopia is following a federal system of administration. Population wise, Ethiopia is the second most populous country in the continent and agriculture is still the dominant base of country's economy. The industry sector, on the other hand, is in its early stage of development with a great focus on construction. The growth of industries is still insignificant, and it is led by the service and agriculture sector.

The education sector is one of the expanding sectors at all levels of the education system; despite, quality problems. The focus of ETP of Ethiopia with its structure and

changes in participation rates are also discussed. As a result, Net student enrolment increased at primary (NER) and gender gap between two sexes reduced. Expansion took similar pattern at all levels of the system. Issues of general secondary school and TVET are also briefly discussed in this part.

Finally, reforms made in Ethiopian higher education system were parts of this section. Four major policy issues- expansion of higher education, privatisation, cost sharing and grant of financial autonomy for higher institutions were also overviewed.

CHAPTER FOUR
RESEARCH PARADIGM, DESIGN, AND METHODOLOGY

4.1. INTRODUCTION

This chapter is about research paradigm, design, and methodology. It begins by reminding the problem statement, discussing research design and paradigm, ontological and epistemological considerations, complementarily of quantitative and qualitative data and issues related to mixed methods research. As the major part of this study, mixed method research and its philosophical underpinning, pragmatism, are addressed under this chapter. The rationale for using mixed method research design, assumptions and challenges of this research method are also described. Thereafter, population and sampling, instruments of data collection, method of data analysis, validity and reliability issues are also explored. Finally, research ethics are included in the last part of this chapter.

4.2. RESEARCH PROBLEM

The major research problem pertaining to this research was to investigate how university-industry linkage is managed in government universities of Ethiopia. Universities are assumed to produce quality graduates that the economy demands. On the other hand, there is a strong argument that universities do not perform their maximum potential in developing nations, as there is no strong link with the industries. The claim also questions the quality of graduates produced by universities, which may partly attribute to the poor quality university-industry linkage.

Despite the above claim, managing university-industry linkage requires the involvement of several stakeholders in creating and strengthening such relation. Universities, industries and the government have roles to play (refer to chapter two, section 2.4) to make the relation more meaningful. Universities as a centre for the production of human capital, providing community services and conducting researches are taken as the major areas of focus in strengthening the linkages with the industries. Consequently, the success of the mission of the universities partly depends on how much the linkage between the two parties brings real change.

Moreover, industries need to collaborate with the universities to remain competitive in the global world. Governments are also assumed to lay a fertile platform for the proper functioning of this linkage. Based on these premises, this research posed the major research question, “How can the linkage between universities and the industry be effectively managed to produce qualified manpower for the economic development of the country?” This overarching question had the following sub-questions:

1. *What is known about UIL globally? What theories, models and concepts are underlying UIL in relation to the study contexts?*
2. *What is the level of management of university-industry linkage in government universities of Ethiopia in terms of planning, organising, staffing and decision-making? What are the major areas of linkage? What benefits are obtained so far from the linkage?*
3. *Is there a perception difference among university managers, instructors and students in relation to the management of UIL in government universities of Ethiopia?*
4. *What are the challenges that hinder the promotion of UIL in government universities of Ethiopia? What opportunities are in place to strengthen UIL?*
5. *How can the practice of management of UIL in government universities of Ethiopia be improved? What appropriate model can be developed to improve the practices?*

4.3. OPERATIONALISATION OF VARIABLES

In this section, the operationalisation of variables for empirical analysis was made in line with the conceptual framework developed in chapter two. The conceptual framework was developed based on the integration of systems theory, human capital theory and the Triple-Helix model to examine how university-industry linkage was managed in the government universities of Ethiopia. In this regard, the input, process and output variables were explained vividly in the conceptual framework to create a link between the basic questions, design, method of analysis and final conclusion and recommendation. Accordingly, both the dependent and independent variables were identified and discussed as follows.

4.3.1. The Dependent Variable

The dependent variable for this study was the level of management of UIL in government universities of Ethiopia. As indicated in the conceptual framework, both the output and the outcome variables are the results of strong UIL. This was described in terms of quality graduates produced, problem-solving research outputs and knowledge production. Moreover, a strong link will result in better employment opportunities, consequently leads to a productive workforce, who can contribute to the growth and development of the country. This was discussed through the basic question number two.

4.3.2. The Independent Variables

The strength of UIL is determined by several internal and external variables. In this study, the independent variables are mainly inputs as identified in the conceptual framework (Chapter Two). Accordingly, the following are the independent variables that determine the strength of UIL in government universities of Ethiopia.

- *University-related independent variables:* As indicated in the conceptual framework, leadership and management related variables affect the success of UIL. Conceptually, this variable was defined in terms of planning, organising, staffing and decision-making for creating a strong link between universities and the industries. It was assumed that the greater the planning process, the greater the link would be. Hence, planning variables like the generation of options, selection of appropriate technologies, implementation and continuous monitoring and evaluation systems were included as independent variables to be measured in the study. In relation to organising, resources are the other important inputs that determine the strength of UIL. Resources for technology transfer, the establishment of innovation centres, infrastructure development, the establishment of different technology incubation centres and conducting problem-solving researches have prime importance in strengthening the link between universities and the industries. In addition to this, staffing, which is filling both universities and industries with the required work force to promote UIL was another variable. Categorised

under this, joint fulfilment of manpower, providing training, joint recruitment, and assessing the quality of graduates were taken as the variables to be measured. Finally, decision-making is another variable that has a great impact on creating a link between universities and the industries. Under this category, generation of options, making joint decisions both by the universities and the industries were taken as the variable to be measured. Therefore, planning, organising, staffing and decision-making activities were taken as variables to be measured from the perspectives of leadership and management.

- *Institutional contexts as the independent variable:* As an independent variable, the availability of internal policies of UIL at the university level, intellectual property rights, existence of institutional strategy, work overload of the university professors and the availability of UIL infrastructure were considered as the independent variables that affect the success of UIL. In addition to this, institutional autonomy, communication practices and the existence of information flow between two parties were considered under this variable.

- *Government-related independent variables:* These variables have a great impact on either facilitating or hindering the role of UIL. Under this category, the availability of encouraging policy platform that promotes UIL was taken into account. Moreover, the government has the major responsibility of allocating adequate resources for UIL as the universities under consideration are government-funded (see the operational definition of terms). Lastly, the government is in-charge of creating structural ties among these parties (government, universities and the industries). Hence, these were considered as independent variables to this study.

- *Industry-related variables:* are mainly seen from their geographical distribution, willingness, awareness, trust and the existing cultural variables. These variables may positively or negatively affect the strength of UIL in government universities of Ethiopia.

4.4. RESEARCH DESIGN AND PARADIGM

The selection of research design for this study depends on the problem statement and the basic questions stated in chapter one, section 1.3 and 4.2 above. To address these questions, a mixed method research design/multiple research design was employed. The choice of this design depends on the assumption that the use of various methods helps to understand the problems of managing - industry linkage in a better way by considering the complexities and contingencies of the human phenomenon (Greene & Hall, 2016: 2). The use of different methods in data gathering from various sources actually broadens and deepens the understanding of the issue.

In relation to mixed research design, pragmatism is used as an underlying philosophical paradigm for this research. This paradigm views the problem from the perspective of the contexts in which the problem prevails and the existing objective reality (Creswell, 2008: 8; Greene & Hall, 2016: 16; Pinto, 2010: 8). This requires the use of both quantitative and qualitative data to address the problem related to the management of university-industry linkage.

4.4.1. Ontological and epistemological considerations

Ontology, the perception of reality and being, (Cumming, 2012: 4; Denzin, 2010: 419) and epistemology, the nature and forms of knowledge (Cohen, Manion & Morrison, 2007: 7; Scotland, 2012: 1) in this research has a close relation with pragmatism. As Ontology is the base for the theoretical framework (Cumming, 2012: 4), the management of university-industry linkage was also conceptualised from the systems theory viewpoints and human capital theory perspectives. In other words, universities are not islands operating in isolation; rather, they are meant to serve the community through research and technology transfer activities. In this case, they are not alienated from the environment in which they are functioning. On the other hand, they should focus on producing quality manpower that the economy demands. Hence, ontologically this research is viewed from the direction of the interaction of mind and reality rather than as independent entities. In other words, it follows ontological pluralism or multiple-realism (Johnson & Gray, 2010: 7).

Epistemologically, this research followed the eclectic approach of inquiry. The Eclectic approach actually contends the blend of inductive and deductive ways of acquiring knowledge yields better results. Inductively, this research tries to gather relevant information through both individual and group interviews to make meanings out of the data (Morse, 2016: 2). Therefore, it follows the constructivist/interpretivist philosophy in this regard. Moreover, it applies the deductive way of acquiring knowledge which strives to get objective, measurable and observable data that can be generalised to the whole population in an attempt to come -up with the general laws and principles that govern the world. However, this way of acquiring knowledge ignores the social and cultural contexts in which the participant is residing. These two extreme cases have their own inherent limitations. As a result, an integration of both inductive and deductive way of acquiring knowledge was adhered to (Morse, 2016: 2). This is the eclectic or abductive way of inquiry, which was applied in this study (Greene & Hall, 2016: 16; Johnson & Gray, 2010: 5).

4.4.2. Complimentarily of quantitative and qualitative approach

This study emphasises the complementary nature of both quantitative and qualitative data than as a rivalry to one another, which is basically, the assumption of mixed research design (Bazeley, 2009: 203; Flick, 2011: 3; Greene &Hall, 2016: 2; Morse, 2016: 3). However, there is still ongoing scholarly debate on whether it is possible to integrate qualitative and quantitative data sets as they depend on different philosophical assumptions (Bazeley, 2009: 203; Creswell, 2012: 537). On the contrary, recent developments in mixed methods research show the acceptance of integrating quantitative and qualitative data (Bazeley, 2009: 203; Johnson & Gray, 2010: 7; Niaz, 2008: 287).

In support of the second argument, this study uses both the quantitative and qualitative aspects of data as indicated earlier. In relation to this, quantitative research, which is also called the traditional/classic/western approach, follows the positivist paradigm (Cohen, *et al.,* 2007: 9; Creswell, 2003: 7; Cumming, 2012: 5). It assumes that the means of obtaining knowledge is through scientific methods by measuring variables objectively (Cohen, *et al.,* 2007: 9; Cumming, 2012: 5; Pinto, 2010: 5). It also follows deterministic and empiricist principle (Creswell, 2003: 7; Cumming, 2012: 5) so as to

formulate laws that lay the foundation for prediction and generalisation using deductive approach (Cumming, 2012: 5; Pinto, 2010: 5; Scotland, 2012: 10). To achieve these objectives, hard, undivided data independent of individual, questionnaires and different experimental designs are used (Cohen, *et al.*, 2007: 9; Pinto, 2010: 5). Similarly, this research employs survey design to gather data that could help to make valid inferences from the finding. Opinions and views of the respondents were gathered through questionnaires and measured objectively.

The application of the qualitative approach to this study was also based on the philosophy of constructivism. It is a philosophical stance that assumes, 'meaning' is not discovered; rather, it is constructed as the result of interaction between consciousness and the world (Scotland, 2012: 11). The existence of multiple and diverse realities, the assumption that social world is subjective, much softer and humanely related (Cohen, *et al.,* 2007: 9) urges this research to consider the qualitative aspects in which the views and experiences of the participants were considered. As stated by Scotland (2012: 11) "our realities are mediated by our senses. Without consciousness the world is meaningless". In other words, the social, cultural and psychological backgrounds have relation with how individuals perceive things. To this end, it is important to consider university-industry linkage from the experiences of the individuals who have direct exposure to the phenomenon. Hence, the real-life setting of the participants in relation to university-industry linkage was considered. In this case, the focus is the relativity of reality as the meaning is interpreted in terms of the life experiences of the respondents. Inductive generation of theory/bottom-up approach was employed to arrive at a certain conclusion using interviews, focus group and open-ended questionnaires. As a result, rich and thick data were produced to come-up with deep insight into the problems of university-industry linkage.

Despite the above views, the application of mixed methods design for this research holds the plurality of seeing, interpreting and knowing things (Greene & Hall, 2016: 2; Niaz, 2008: 288). This study did not follow strict dichotomy between the quantitative and qualitative approaches, as the two approaches integrate along the continuum to arrive at better results (Bazeley, 2009: 203; Flick, 2011: 8). The actual practice of the research world also shows the integration of the two approaches than treating them

separately. Even in the first two decades of the 20th century (quantitative methodology period), researchers were using mixed method design by including qualitative data in their studies without directly acknowledging it (Pinto, 2010: 6). For instance, extensive use of both quantitative and qualitative data (interview and observation) was observed during Hawthorne studies (Pinto, 2010: 3). The interaction effect obtained from these two approaches was assumed to offset the weakness of the survey design by adding data from the qualitative part through the interviews (Flick, 2011: 8). This shows the complementary nature of the two research approaches, which holds true for this research too. As a result, to strengthen the reliability and validity of the research, the complementary nature of qualitative and quantitative data were more emphasised.

4.4.3. Mixed methods approach

Mixed/multi-method/convergence/integrated/combined approach (Creswell, 2009: 14; Morse, 2016: 3) was employed in this study. It was introduced to the research world as the third methodological movement to end the paradigm wars between the quantitative and qualitative approach (Cameron, 2011: 96). The mixed research design was used in this research with the strong assumption that using various data from different sources assumed to produce better results than the monotype (Pinto, 2010: 4). The combination of quantitative and qualitative datasets, integrating and interpreting the results was believed to address the basic questions in a better way (Creswell, 2008: 5).

In addition to the above ideas, the practicality of mixed research in this study followed the philosophy of pragmatism, which sees problems from its actual phenomenon by mixing both data strands (Cameron, 2011: 101; Greene & Hall, 2016: 16; Pinto, 2010: 8).Hence, various methods, multiple worldviews, different assumptions and the application of various forms of data collection, analysis and interpretation techniques in the context of mixed methods research were considered in this study (Creswell, 2003: 14). Putting its strong foothold in the mixed research, pragmatism, involves methodological pluralism (Cameroon, 2011: 102) by integrating different methods both from the quantitative and qualitative aspects to address the basic questions raised in the process of inquiry (Niaz, 2008: 291; Pinto, 2010: 3). It makes use of both qualitative and quantitative aspects to tackle the real problem of the world.

By combining the two approaches and making use of the advantages of each of the specific methods, the researcher may arrive at the sound conclusion that reflects the actual social, political, cultural and economic setting of the problems. Taking these advantages into account, this research also employed mixed research design to have a better understanding of university-industry linkage in government universities of Ethiopia. Data were gathered quantitatively through questionnaires and qualitatively through individual, group interviews and document reviews.

4.4.3.1. Rationale for mixed research

In the contemporary world where there are multiple realities and knowledge explosion, because of the expanding technology using multiple techniques of data gathering is more important than using mono design (either quantitative or qualitative) (Greene & Hall, 2016: 2; Niaz, 2008: 288; Pinto, 2010: 6).The justification behind this is that using various methods to address a single research question will potentially broaden the understanding and the scope of research (Greene & Hall, 2016: 2; Greene, 2008: 15). Perhaps, this will lead to more precise and integrated view of human behaviour and experience. In relation to this, the mixed research design was employed for this research due to its prime importance to see the problems from multiple perspectives in order to arrive at a sound conclusion. In other words, the researcher strongly believes that using both quantitative and qualitative data provide a better understanding of the research problems than either of them. The advantage of mixed research design lies in the ability of the research to build the strengths of both the quantitative and qualitative data (Creswell, 2012: 353). The merging and integration of these data are assumed to bring better results. In the similar vein, the integration of two data sets adds value to the validity of the research findings.

Likewise, in this study, systematic investigation of variation in the social construction of meanings among interviewees and survey respondents may be not only important in validating research tools and scales, but also important in producing complementarily subsets of research results, which may enrich the overall research findings (Bergman, 2010: 172). This increases the dependability and transferability of the results obtained.

4.4.3.2. Assumptions and challenges of mixed method research

Mixed/multiple designs involve eclectic approach. It has several assumptions that underlie its philosophical underpinnings- pragmatism. As indicated in Creswell (2003: 14; 2008: 10-11) mixed research and its philosophy– pragmatism is nested in the following knowledge claims.

To begin with, pragmatism does not support the existence of a single system of philosophy and reality. There is no single and holistic way of obtaining knowledge, which is applicable under all circumstances. Secondly, as a human being is given the freedom to choose in every walks of his/her life, researchers who engage themselves in mixed methods are free to use appropriate methods, techniques and procedures that best meet the requirements and purposes of their research question. The other important assumption in mixed methods research is that the world is not seen as an absolute unity by pragmatists. In a similar vein, mixed method researchers, search for various approaches to collecting and analysing data rather than sticking to one of the methods (quantitative or qualitative). In fact, this assumption goes in opposite direction with that of the positivists.

The other point that demands attention in relation to the assumption of mixed method research is the concept of truth. Pragmatists view truth in terms of its applicability at a time. There is no such static dualism between mind and reality seen completely different from mind. Therefore, based on this premises, mixed method researchers advocate the use of both quantitative and qualitative data as they provide a holistic picture of the phenomenon. Still more, pragmatists interrogate “what” and “how” to research based on its assumed consequences, implying, where they plan to go with it. Similarly, mixed researchers are expected to justify the purpose of mixing and rationalize why it is important to mix quantitative and qualitative datasets. Finally, pragmatists believe that research is not conducted in a vacuum, rather, in a given social, historical, political and other contexts. In this way, mixed method studies may contain postmodern turn, a theoretical lens that is reflective of social justice and political claims.

From these assumptions of mixed design, it can be critically viewed that, there is no system of philosophy that fits all the situations. The researcher should look for better options to arrive at a certain solution in relation to the problem statement and the objectives of the study. Reality is viewed from its applicability rather than following strict dualism of mind and reality. Therefore, mixed method researchers are expected to know the purposes, stages and strategies of mixing data. In line with this, the social, cultural, historical and other contexts of the research should also be taken into consideration in conducting mixed research.

Despite the advantage obtained from the mixed design as result of integration, this design has some methodological and procedural challenges. The major problem in relation to the mixed method is the stage at which both quantitative and qualitative data are integrated to warrant its knowledge claim (Cameron, 2011:104). However, this requires mastery and proficiency in integrating and analysing data in the area of mixed methods. Therefore, adequate knowledge of both data strands, and the stages and strategies at which the data are mixed needs serious attention so as to comeup with better results. This will lead us to the strategies of mixed method design.

4.4.4. Mixed method designs

Mixed method research is particularly important for investigating variations in the construction of meanings in relation to how participants, for example, construct meaning out of their experiences or report on attitudes in interviews or questionnaires, respectively (Bergman, 2010: 172).There are different techniques/strategies of mixed design based on the time, type and sequence of data collection and interpretations.

Convergent/parallel/concurrent design allows the simultaneous gathering of qualitative and quantitative data followed by separate analysis of the collected data. After analysis, interpretation of the obtained data will follow. The other common types of mixed design are explanatory sequential design and exploratory sequential design. These two types of designs primarily differ in the amount of data the researcher collects either qualitative or quantitative. In explanatory sequential design, quantitative data collection and analysis will be succeeded by qualitative data collection and analysis. Embedded design is also another mixed design in which both quantitative or

qualitative data and quantitative or qualitative data are collected, analysed and interpreted. Finally, transformative design commences with the collection and analysis of quantitative data followed by collection and interpretation of the qualitative ones

(Creswell, 2012: 54; Biesta, 2016: 7). Each of the stated techniques has their own advantages and disadvantages which are beyond the scope of this thesis.

4.4.4.1. Concurrent mixed design

Taking into account the relative advantages of each of the designs, this study employs convergent parallel design. As put by Creswell (2012: 540), the aim of convergent/parallel/concurrent design is to collect both quantitative and qualitative data at the same time, combine the data and use the results to understand the problem in a better way. The basic assumption behind this design is the use of both data strands strengthens the understandability of the problem under study. In fact, this will offset the weakness of the other forms of data, and the cumulative effect will increase the validity of the research results. The diagrammatic representation of this design is depicted below.

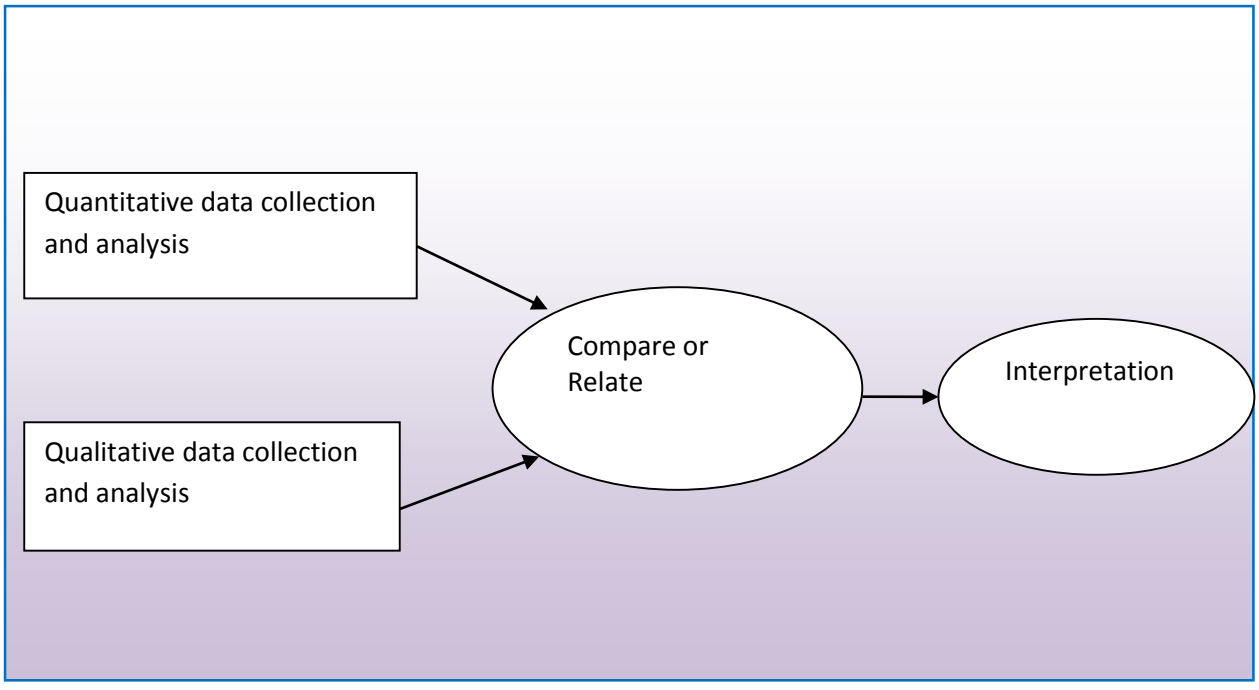

Figure 4.1: Diagrammatic representation of convergent/parallel design (Creswell, 2012: 541).

As indicated in Figure 4.1 above, convergent mixed method design allows the researcher to gather both quantitative and qualitative data simultaneously and analyse both datasets separately. Following this, the researcher compares the results obtained from both the quantitative and qualitative datasets so as to make a valid interpretation as to support or contradict each other. This comparison gives the researcher "convergence" of data sources (Creswell, 2012: 540). In this process, the researcher gives equal importance to both quantitative and qualitative data. They equally served as the sources of information for this study; hence, data were collected concurrently. Qualitative and quantitative data obtained from the respondents counterbalance the weakness of the other and result in better finding. The results of both data sets are compared whether the results are similar or different. In relation to this study, the description of both quantitative and qualitative data was made side by side in the discussion section of the analysis.

4.5. POPULATION AND SAMPLING

The population of this study were government universities, university management bodies, academic staffs, students, graduates and industries. Government universities became the site of this research because private universities are fee-charging institutions so that students join based on their best interest and market gaps. However, this is limited in the cases of government universities as students join different departments primarily based on their results of Ethiopian Higher Education Entrance Certificate Exams (EHEECE).

During the time of data collection, there were 31 government universities in Ethiopia (i.e. excluding the two civil service universities and eleven recently opened universities). These universities are clustered into three, depending on their age of establishments and the number of students they take. Primarily, as indicated in chapter one, before the downfall of the military government regime Ethiopia had only two universities (Addis Ababa and Haramaya universities). As the part of this category/cluster, the government upgraded seven colleges to universities. As a result, Mekelle, Bahir Dar, Gonder, Jimma, Adama, Hawassa and Arbaminch were included in this category and their years of establishment covers from 1950 -2000. They are nine in total.

These universities are relatively matured, old and well experienced as compared to others. They have relatively better facilities, experienced academic staffs and better involved in research and community service activities (Abeya, 2014: 197). Furthermore, they host a huge number of students ranging from 51,870 Addis Ababa University to 16,455 students in the case of Arbaminch University (MoE, 2015: 164). They are also devoted to producing high-level professionals for other younger universities by providing them with postgraduate studies for their staff members. These categories have different names like old/experienced/first generation universities.

The second category of universities is also established as the result of the countries in felt demand for the educated work force. The second-generation universities contain 13 universities. Within this category Dilla, Debre Berhan, Debre Marqos, Wollo, Dire Dawa, Jigjiga, MadaWolabu, MezanTepi, WolaitaSodo, Semera, Wollega, Ambo and Aksum universities are falling. Primarily, these universities were allowed to provide undergraduate programmes, though, through time some of them are permitted to give postgraduate programmes. Their establishment covers from 2007 to 2008 academic years and they are considered as medium/young/second generation universities (Abeya, 2014: 197). The recent data obtained from the ministry revealed that their enrolment ranges from 5013 in the case of Semera University (with the smallest enrolment) to Debre Marqos (33,884) which is even greater than some of the enrolment of the first generation universities (MoE, 2015: 164). Wolkitie, Wachamo, Woldia, Metu, Debere Tabor, Bule Hora, Adigrat, Assosa, Addis Abeba Science and Technology universities are among the third generation universities. These nine universities are under construction, and they did not start to graduate students in some fields like engineering and technology as the study may take about five years.

These newly established universities have relatively shortages of academic staffs, teaching-learning materials, infrastructure and other related services. They are not operating in their full capacity as they are under construction. They also did not start graduating students for the very simple reason that they are young. Each of them hosts less than five thousand students (MoE, 2015: 164). They also lack experiences of university-industry linkage and may distort the overall picture of the finding. Therefore, they are purposely exempted from the sample.

Contrary to this, the above two categories of universities (generation 1 and 2) are better equipped with resources and are even entitled to provide postgraduate programmes so as to meet the human power demands of these new universities and the labour market in general. Accordingly, the sample respondents are drawn from these universities. The lists of these universities are shown in the following table as follows.

Table 4.1: List of Ethiopian government universities based on their establishments

No	Old/experienced/1st Generation universities	Young/2nd Generation universities	
1.	Mekelle*	**8.**	Debre Marqos
2.	Bahirdar*	**9.**	Wollo
3.	Jimma	**10**	Dire Dawa*
4.	Haramaya*	**11.**	Woliyta
5.	Adama *	**12.**	Wollega*
6.	Arbaminch	**13.**	Ambo
7.	Hawassa*	**14.**	Aksum

Source: MOE (2015: 164)* Represents sample Universities for the study

As indicated in Table 4.1 above, the first seven universities (1-7) are relatively experienced when compared to others, whereas, the second-generation categories (8-14) are relatively young when compared with the first one. After merging two categories (from 14 universities), seven of them were included in the sample using simple random sampling, specifically using a lottery method. The application of this method is justified on the ground that it gives an equal chance for the population to be selected as a sample and avoids bias (Creswell, 2007: 185; Gomm, 2008: 138; Singh, 2007: 166; Collins, 2016: 6; Kumer, 2005: 35).

As indicated in the above Table 4.1 again, these listed 14 universities have been graduating students until the end of 2014. From the first generation universities indicated earlier, Gonder University and Addis Ababa University were excluded from

the sample, as they do not have graduates in Band 1 and Band 5. The case for Addis Ababa University may be because of the establishment of Addis Ababa science and technology as a separate university under the third generation. Gonder University may not have graduates as its focus of training is in health and medical sciences.

Currently, Ethiopian universities request their intake capacity as per the government strategy of 70: 30 which implies students who join universities should constitute 70 percent hard sciences and the remaining 30 percent are placed in social sciences (FDRE, 2010a: 5; FDRE, 2016: 50). The 70:30 proportions refer to the government's strategy to place 70 percent in science and technology fields (hard sciences) and 30 percent for social sciences (soft sciences). This is designed with the assumption of the country's future development plans in those fields and emerging labour market that demands a greater number of graduates in science and technology-related fields.

Based on these assumptions, the field of study in universities are divided into six bands:

- Band 1- Engineering and Technology
- Band 2- Natural and computational sciences
- Band 3- Medicine and Health Sciences
- Band 4- Agriculture and Natural Resources
- Band 5- Business and Economics
- Band 6- Social science and humanities

From those above listed six bands, two bands (Band 1 and Band 5) were selected randomly and included in the sample using simple random sampling (Creswell, 2012: 143). In fact, Engineering and Technology College constitutes about 40 percent of the placements from the hard sciences, and the same is true for business and economics from social sciences. These two bands constitute 33.3 percent of the total six bands by simple proportion. Hence, they can be representative of the universities.

From the first generation universities, Haramaya, Bahir Dar, Jima, Adama, Hawassa, Arbaminch and Mekelle have graduates in these two bands (Band 1 & Band 5). Similarly, from the second-generation universities, Debre Marqos, Wollo, Dire Dawa, Woliyta, Wollega, Ambo and Aksum have graduates in these two bands (MoE, 2015:

164). Others do not have graduates in those fields, or they are young enough to have graduates in those bands. This is one exclusion criteria from the sample. From these universities again, Haramaya, Bahir Dar, Adama, Hawassa, Mekelle, Dire Dawa and Wollega universities were included in the sample. They were selected after merging the two categories, and it seems representative in terms of the establishment of universities and even, in their regional distribution within the country.

Graduating students from each department were selected from the rest purposefully because of their exposure to the field of work through different practical courses during their graduation year. Largely they were supposed to join the field of work after the graduation and better know the experiences of the universities in linking with the emerging industry. Hence, they were assumed as better informants in what ways their university was working with the industries, the strength of this linkage, and the level at which their curriculum was related to the field of work and how this linkage was managed in the process of human capital development and technology transfer. In relation to this, they stood in a better position to react to the questionnaires prepared for this study.

As indicated in Table 4.2, seven universities were included in the study. Five of them were from first generation universities while two of them were from the second. Sample universities were selected after two categories of them were merged together. A total of 8,734 graduating students were found in Band 1 and Band 5 while there were 2,487 instructors in both bands. From this, 381 students and 350 Academic staffs (231 instructors and 119 department heads and college deans), totally 731 respondents were included in the survey.

Table 4.2: Sample respondents from universities

No	Name	Students				B1 & B2	Sam-ple	Academic staffs			B1 & B2	Sample
			M	F	T			M	F	T		
1.	Adama	B 1	1266	118	1384	2064	**90**	356	15	371	507	**71**
		B 5	561	119	680			121	15	136		
2.	Bahir Dar	B 1	538	190	728	1304	**57**	374	32	406	520	**73**
		B 5	458	118	576			103	11	114		
3.	Dire Dawa	B 1	196	105	301	717	**31**	150	15	165	255	**36**
		B 5	318	98	416			80	10	90		
4.	Haramaya	B 1	390	21	411	730	**32**	235	22	257	352	**50**
		B 5	261	58	319			82	13	95		
5.	Hawassa	B 1	997	175	1172	1769	**77**	215	43	258	361	**50**
		B 5	474	123	597			76	27	103		
6.	Mekelle	B 1	461	80	541	1559	**68**	213	22	235	285	**40**
		B 5	664	354	1018			47	3	50		
7.	Wollega	B 1	49	4	53	591	**26**	119	1	120	207	**30**
		B 5	432	106	538			79	8	87		
Total						8734	**381**				2487	**350**

This size was determined based on the sample size determination indicated in different statistical books (Johnson & Christensen, 2008: 242; Cohen, *et al.,* 2007: 104). They suggest 370 for a population of 9,000 and 335 for the population of 2,600 at the confidence level of 0.05. This means that the researcher is confident enough to generalise to the whole population at 95% confidence level. However, some extra questionnaires were considered to increase the response rate during the time of data collection. This would be statistically sound as the issue of representativeness increases with the increase of the sample size. The sample size for this research was determined by using a simple formula of sample size determination, which is written as:

$n= N/1+Ee^2$; Where n= is sample size, N= number of population, E= Population and e= standard error square (0.05^2)

$N= N/1+Ee^2$ $8,734/1+8,734* (0.05)^2 =$ **382**

N= N/1+Ee^2 = 2487/1+2487* (0.05)^2 = 345, which is nearly the same with the table value indicated above.

The respondents were selected randomly from the graduating class by giving them equal proportion for each department. This was by using a simple random sampling technique and students were selected by using systematic, simple random sampling by referring to their identification number as the reference point.

For group interview, graduate students were selected purposefully for this research since it was very difficult to identify their distribution after graduation. Moreover, it was not easy to find the accurate data of graduate students to apply probability sampling for them. Graduates in the area of science and technology were used as the basis for selecting participants. In addition to this, the experiences of the graduates were taken into consideration to obtain the real picture of the partnership adequately. From the industry sector, some manufacturing, construction and service industries (Ethiopian Telecommunication and Commercial Bank of Ethiopia) were used as the sources of information (see Appendix, C). Ministry of science and technology was also included in the interview as a government agency, which is in charge of forging such relationships as indicated in Proclamation No 691/2010 (FDRE, 2010: 5645).

4.5.1. Instrumentation and data collection procedures

The selection of the instruments of data collection is dictated by the research problem and the type of data needed for this study. In line with this, the following data gathering instruments were used in this study.

4.5.1.1. Survey questionnaire

This research employed questionnaires as data gathering instrument because it helps to obtain wider information from a geographically dispersed sample population and makes possible the economy of time and costs (Best & Khan 2003: 301; Creswell, 2009: 145; Cohen*, et al.*, 2007: 317). The use of questionnaires in this research was justified on its potential to provide a greater proportion of usable responses, relatively unbiased, factual data, opinions and attitudes in the structured framework from the

participants (Creswell, 2009: 145). In relation to this research, the number of universities is widely distributed all over the country. There were also various stakeholders, who could determine the effectiveness of university-industry linkage. Currently, universities in Ethiopia are hosting more than 503,569 students (MoE, 2015: 151) and 24,252 academic staffs (MoE, 2015: 12) and as a result, this instrument is relevant to address these diverse populations.

The questionnaire had both closed and open-ended for three groups of the respondents: students, academic staffs and management bodies (College/faculty/school/institute deans and department heads) (Appendix-E, F &G respectively). In this regard, college/faculty/school/institute or school were used interchangeably in the Ethiopian government universities. Specific questions related to the responsibilities of the respondents were included in each group. There were also common questions for three groups of respondents to compare their views on the issue. Administrative staffs were deliberately excluded from the research because they are not directly concerned with producing capable graduates.

Open-ended questions were justified, because it calls for free responses in the respondent's own words (Best & Khan, 2003: 301). The questionnaires were prepared in line with the theoretical framework and the research questions raised in chapter one and two. The first part of the questionnaire was about the background of the respondents; whereas, the main body of the questionnaire contained issues directly related to the university-industry linkage. In this part, managing university-industry linkage, the level of collaboration and challenges hindering the linkage were included. Moreover, the questionnaire addressed the opportunities for promoting university-industry linkage. Lastly, open-ended questions were the part of the questionnaire to get the general views of the respondents on the issues raised so far.

4.5.1.2. Individual interviews

Individual interview was used in this study as it allows greater flexibility for the interviewer and the interviewee for better chance to explain more explicitly, what he/she feels on the issue (Best & Khan, 2003: 323; Cohen, *et* al., 2007: 349). By using this technique, the researcher solicited thick data that enriched the finding of the study.

As a result, a semi-structured interview guide was prepared for university-industry linkage offices, Ministry of Education (MoE), the Ministry of Science and Technology (MoST), some manufacturing, construction and service providing sections of the industry sector (See appendix H-K). University-industry linkage offices were established in many government universities of Ethiopia. The directors of these offices were assumed as informants for this study. On the part of the government, the ministry of science and technology is in charge of promoting university-industry linkages. It is both responsible for managing and promoting issues related to innovation, patent right and technology transfer (FDRE, 2010: 5646). To have the overall picture of the study, it was convincing to include them in the interview. From the parts of the industry, manufacturing, construction and service-providing industries (telecommunication and commercial banks of Ethiopia) were part of this interview.

A semi-structured interview was designed in relation to the research questions and the theoretical framework of the study. A total of six-eight general questions were designed for this purpose (Appendix H-K). Under each of the general questions, there were some specific questions for clarity. These questions were designed in such a way that they were supposed to fill the gaps in the questionnaires to get thick data description. Convenient time was selected with the consultation of the interviewees at their most convenient time. The interview took them nearly 50-60 minutes. This was applied until information is saturated and sufficient for the study. The interview was conducted by the researcher supported by electronic devices, which helped to record their voices for later transcription and interpretation of data.

4.5.1.3. Focus group interview (FGI)

Focus group interview as the third technique was also conducted with the university graduates. This instrument was defensible on the ground that it was very difficult to address the graduates/alumni through instruments like questionnaires. Semi-structured focus group interview guide was prepared for the graduates of government universities in Ethiopia. Seven general questions related to the basic questions were prepared as a guide. The interviews were conducted with the respondents for about 90 minutes (Appendix-L). The number of participants in each group ranged from six to seven. Data collection was supported by recording their voices to transcribe and

interpret the results of the interview properly. Focus group interview highly values the information obtained from the interaction, as the cumulative effect of individual's idea would have a positive impact on the reliability of the data obtained. The result obtained from this interview was also included as the part of the analysis in the study.

4.5.1.4. Document reviews

This study used documents like university proclamations, policies related to UIL and directives of the Ministry of Science and Technology (MoST) for analysis. Moreover, Education and Training Policy (ETP, 1994), its ESDPs, the different government plans like GTP I & II and statistical abstracts of Ministry of Education (MoE) were reviewed additionally to supplement the above instruments.

4.5.2. Data collection procedures

As indicated in the research design section, both quantitative and qualitative data were collected simultaneously. Data collection started immediately after approval of the ethical clearance from UNISA (Appendix, B). In addition to this, letter of permission was received from both the Ministry of Education (Appendix, D) and Dilla University (Appendix, C). Following this, instrumentation validation activities were conducted through pilot testing.

After necessary adjustments, an adequate number of the questionnaires were also duplicated before directly moving to the data collection sites. The schedule was arranged with the respondents to increase the response rate. The objectives of the study, the number of items included and the maximum amount of time it took them to fill the questionnaires were cleared from the very beginning (Appendix E-G). Field editing of incomplete questionnaires was also conducted.

For the qualitative part, the schedule was arranged with the respondents at their best convenient times. Questions were asked in their logical order. Attempts were also made to make the interaction more democratic and smooth. Data were recorded at the time of interaction to refer at the time of analysis and interpretation. The role of the

researcher was to facilitate the interview and pose probing questions in relation to the basic questions and the statement of the problem stated earlier.

4.6. METHOD OF DATA ANALYSIS AND INTERPRETATION

The method of data analysis for this research was directly related to the problem raised in (4.2), research design used (4.4.4.1) and type of data collected (4.5.1) above. As indicated in the previous sections, mixed research approach employs both quantitative and qualitative data so as to increase the advantages of both data types. Specifically, the convergent mixed research design was used in this study. The analysis was also made in line with the principle of this design as indicated by Creswell (2012: 550). This veteran writer in the area of mixed research puts four different options in analysing the convergent parallel design. The first is to provide a discussion - inside by side analysis -about the themes emerging from the data and how they support or negate the results of statistical analysis. The other way of analysis is to merge both quantitative and qualitative data to arrive at new variable or theme for the purpose of testing or exploration. The third case involves quantifying qualitative data to compare the data directly with the statistical results. This may involve quantifying qualitative data by categorising the results into themes, then changing into frequency counts. Finally, both data strands are shown in a table, and joint display will be made to make an easy comparison. In the case of this study, the first option was adhered to. This means, both quantitative and qualitative datasets were analysed separately and merged at the time of interpretation side by side for easy comparison. In other words, quantitative data from questionnaires were factor analysed by themes, results compared with the themes analysed from qualitative data. Quantitative data results were directly compared with the results of the qualitative ones. Finally, the integrative interpretation was made in the discussion section. The detailed analysis of both data strands is presented as follows.

4.6.1. Quantitative data analysis

Data collected through questionnaires were analysed using both descriptive and inferential statistics. To begin with, data collected from the field through questionnaire were arranged and given codes for each of the questionnaires. Numerical values were

also assigned to each responses ranging from five to one (5 – 1) for strongly agree to strongly disagree or from very high to very low. Following this, raw data were fed into the computer and analysed using statistical package for social sciences (SPSS) version 23.

Issues related to the background of the respondents like gender, age, qualification and so on were analysed using descriptive statistics like percentages and frequency counts. On the other hand, the level of university-industry linkage, benefits accrued from such linkages, challenges related to promoting such relationships were analysed using inferential statistics to see opinion difference among different groups of respondents (students, teachers and college deans). These basic questions were addressed through rigorous quantitative analysis. The result of the analysis was reported using tables and at a confidence level of $\alpha=0.05$. To address this, different higher-level statistical tools like t-test, ANOVA and factor analysis were used. The interpretation consists of summarising results, comparing the finding with the previous literature and theories, advancing the limitations of the study and indicating for the possibilities of future research.

4.6.2. Qualitative data analysis

Data obtained from open-ended questions, individual and group interview were analysed qualitatively by categorising into their themes. After collection, data were organised for individual interviews and group interviews in separate folders. This also considered the study sites; in this case, government universities and industries/ organisations selected as a sample. Data collected through an interview by using audiotaping and field notes were carefully transcribed by the researcher himself. This helped the researcher to refer the results during the time of coding, analysis and interpretations.

Coding is the process of segmenting and labelling text from transcribed data (Cohen, *et al*., 2007: 480; Creswell, 2012: 238). Accordingly, an organisation of data gathered from respondents would take place. Following the organisation of data, many segments of texts were identified after detail reading of the transcribed data. From these segments again, many codes were identified that were categorised into several

codes and further reduced to five to seven themes in relation to the basic questions raised earlier (Section5.4.2). During coding, important points were highlighted and marked at right margins of the transcribed texts. Finally, the coded texts were changed into themes in which the themes further form hierarchies or layers. In general, this study followed steps identified by (Bergman, 2016: 9; Cohen, *et* al,. 2007: 461-471; Creswell, 2012: 261-262) which include preparation and organisation of data, coding, forming themes, reporting, interpretation and validation of the accuracy of data through triangulation and member checking.

4.7. VALIDITY AND RELIABILITY OF RESEARCH

Validity and reliability of instruments were determined using different mechanisms in this study. Conceptually, Validity is defined as the extent to which an instrument measures what it supposed to measure (Heale & Twycross, 2015: 66; Wiersma & Jurs, 2009: 356). It tries to measure the truthfulness of the research results. In quantitative research, validity shows the objectivity, measurability, generalisability and transferability of the research findings to the wider population (Cohen*, et al*., 2007: 138). It is about the appropriateness of the interpretation of the results of the test or inventory, and it is specific to the design used (Wiersma & Jurs, 2009: 356).

Validity in mixed research also takes various forms. There are nine types of validity in mixed research depending on the Meta inferences made from the research. In this regard, Meta inference implies the conclusion or inference that builds on or integrates both qualitative and quantitative findings (Johnson & Christensen, 2008: 283). Inside-outside validity, paradigmatic validity, commensurability mixing validity, weakness minimisation validity, sequential validity, conversion validity, sample integration validity, political and multiple validities are identified in the mixed research (Johnson & Christensen, 2008: 284). Inside-outside validity shows the extent to which the mixed researcher reports the subjective view of the insider and being objective in reporting as an outsider. Paradigmatic validity reveals the level to which the researcher uses and understands the epistemological, ontological, axiological, methodological and rhetorical beliefs underlying both the quantitative and qualitative approaches in such a way that it helps him/her to merge the data to make meaningful inferences.

Commensurability mixing validity reveals the extent to which the mixed researcher makes use of the integrative benefits of this research method.

Weakness minimisation validity is about minimising the weakness of one research approach and increasing the other by looking for a better method. The other type of validity in mixed research is also the sequential validity of both quantitative and qualitative data. In the case of this convergent research, validity is employed as both data sets are collected simultaneously. In addition to this, mixed researchers should also consider the conversion validity in which quantitative data are converted to the qualitative aspect or vice versa (quantitasing or qualitativising data) (Creswell, 2012: 551). Sample integration validity shows the extent to which quantitative and qualitative sampling designs produces quality Meta inferences whereas political validity is about the consumers of mixed research methods value the inferences obtained by integrating both data strands. Lastly, multiple validities show the extent to which mixed researcher successfully addresses both the quantitative and qualitative aspects (Johnson & Christensen, 2008: 284). However, one can understand that not all types of validity in mixed research are exclusive of one another. The error made in one aspect of validity will have an impact on the other. Hence, this research employs multiple validity techniques in mixed -method research.

Scholars in the field try to identify different kinds of validity. Primarily, content validity tries to measure the representativeness of the items in relation to the domain established (Wiersma & Jurs, 2009: 358; Cohen, *et al.*, 2007: 137). Secondly, criterion-related validity tries to measure the validity of instruments against certain pre-determined standards. In this regard, there is convergent validity in which the instrument has a positive correlation with the instruments measuring similar variables. On the contrary, divergent validity measures the existence of a poor relationship between the instruments, and predictive validity is about the relation of instruments with the future criterion (Heale & Twycross, 2015: 66). Lastly, construct validity shows the logical and empirical analysis of constructs in the study. As stated by Wiersma and Jurs (2009: 356), here, constructs reveal the theoretical constructs or variables being measured, not the technical construction of the items.

In relation to this research, content validity and construct validity were employed. The content of the research was maintained by considering the domain of the research, which is managing university-industry linkages. The domain takes into account the conceptual and theoretical frameworks indicated in chapter two of this thesis and the review of the related literature part (Chapter Three). To make sure that the contents were properly covered, the comments given by the supervisor were adequately included in the instruments. To check its face validity, which is the major aspect of content validity (Heale & Twycross, 2015: 66), experts from the field (Dilla University) commented on its adequacy in line with the topic and the basic questions raised. In addition to content validity, construct validity of the instruments were also seen from the perspectives of the conceptual framework designed in chapter two.

In research, the reliability of instruments contributes to its validity, though; it is not a sufficient condition. Reliability is the consistency or stability of the instruments of data collection over time (Heale & Twycross, 2015: 66; Johnson & Christensen, 2008: 144; Wiersma & Jurs, 2009: 355). This implies that respondents who participate in completing the same instrument at different times relatively rate the same result in certain periods of time.

Stability of instruments can be checked through test re-test mechanisms. Various literature tries to measure the homogeneity/internal consistency of the instruments using item-to-total correlation, split-half reliability, Kuder-Richardson coefficient and Cronbach's alpha (Heale & Twycross, 2015: 66; Johnson & Christensen, 2008: 147; Wiersma & Jurs, 2009: 356). The following section tries to address how the validity and reliability of data were made by using pilot testing, triangulation, member checking and external auditing.

4.7.1. Pilot testing

The consistency of the questionnaire prepared for data gathering was pilot tested for its internal consistency. This was to assess whether the designed questionnaire could solicit the desired information or not. To arrive at this stage, a sample of 25 questionnaires was distributed to students (15 for Engineering and Technology students, and 10 for business and economics college students), 10 instructors, 7

department heads and 5 college deans. The result was fed into the computer and analysed using SPSS software for its reliability.

In this thesis, Cronbach's alpha was used as it is the most commonly used test to measure the internal consistency of the instruments (Heale & Twycross, 2015: 66; Wiersma & Jurs, 2009: 356). The Cronbach's alpha result ranges from 0 to 1 implying that the greater alpha value is more reliable as it approaches one. It is especially applicable to items, which have five response options (Wiersma & Jurs, 2009: 356). Accordingly, the Cronbach's alpha result for students 0.948 for 76 items and for university managers and instructors 0.93 for 87 items show that the instruments are reliable. After the output had been obtained, possible modifications were made. This included clarifying ambiguous words, avoiding redundant questions and operationalising jargon words (Postlethwaite, 2005: 20). Finally, adequate numbers of questionnaires were duplicated, and data collection was made.

4.7.2. Triangulation

Triangulation in social sciences involves mapping out of the richness and complexity of human behaviour from multiple perspectives by using both the quantitative and qualitative data (Cohen, *et al.,* 2007: 143). In relation to this research again, to maintain the validity of research triangulation was made using different data sources and by employing various instruments. Triangulation is a method of corroborating evidence from different individuals or groups and applying different data gathering instruments to come-up with better research findings (Creswell, 2012: 259). This research also employed different individuals, groups and organisations as data sources for managing university-industry linkages.

From the university, students, academic staffs, college deans and members from university-industry linkage offices were used as data sources. On the side of the government, ministry of science and technology (MoST) and Ministry of Education (MoE) were also included as data sources. Representing industries, individuals from the construction, manufacturing and service industries were parts of this research. Graduates/alumni were also included in this research. The data obtained from these various sources using questionnaire, individual, group interviews and document

reviews were triangulated. This was conducted at the discussion or data integration section of the research.

4.7.3. Member checking

The accuracy of this research report was checked by one or more participants, which is called, member checking (Creswell, 2012: 259). To check the accuracy of the results obtained, the finding of the study was reported back to the respondents for qualitative data. The completeness of the description made and accurateness of the themes was checked by the respondents. Moreover, member checking for the appropriateness of the interpretation made and adjustments were also made where there was misunderstanding before the final submission. The feedback was obtained both by telephone and through emails. As a result, additional comments were included as deemed necessary to strengthen the validity of the finding.

4.7.4. External Auditing

To check the validity of the research finding, external auditing system was also conducted by research supervisor and another expert from the field (Creswell, 2012: 260). This helps to check whether the finding was based on factual data or not. Similarly, the auditor and the supervisor check the acceptability of inferences made and the themes derived from the codes. The overall attempt was to increase the credibility and validity of the research findings. Therefore, this was addressed both at the end of chapter five and chapter six before the finalisation of the research work.

4.8. RESEARCH ETHICS

This research considered ethical issues as its fundamental principles. This helped the researcher to understand the values, culture and contexts in which the research was conducted. In relation to this, axiology is considering ethics and values that enhance the understanding of research (Comming, 2012: 4; Johnson & Chrestensen, 2008: 283). Research ethics usually include informed consent, anonymity and confidentiality, voluntary participation, risk-free participation, honesty and transparency in reporting the results. Each of them is discussed in relation to this study as follows.

4.8.1. Informed consent

In this study, consent of the participants was highly valued before they were requested to provide any information. The basic premise behind informed consent was participants in the research project should adequately be convinced to participate in the research (Creswell, 2008:89; 2012: 22). To get the consent of the participants, a detailed description of the aims and objectives of the study was provided to them. Parts and types of questions included in the research were also explained for the respondents to respond confidently to the questionnaires (Johnson & Christensen, 2008: 114). On the part of the researcher, a support letter from Dilla University and the Ethiopian Ministry of Education was obtained before collecting data (Appendix, C &D). In addition to this, ethical clearance was also received from UNISA (Appendix, B). After having ethical clearance from those institutions, access to information was requested by using official letter, which describes the detail aim of the research project and data collection methods to get official permission (Creswell, 2012: 23).

4.8.2. Anonymity and confidentiality

The other point that was considered as the ethical issue was anonymity and confidentiality. Johnson and Christensen (2008: 119) refer anonymity as keeping the identity of the participant from anyone, including the researcher himself, whereas confidentiality is unrevealing the identity of the research participant to anyone other than the researcher and his/herself.

In relation to this research, to maintain the anonymity of the respondents, codes were used instead of their actual names in such a way that it could not be identified by other individuals (Creswell, 2012: 231). It was also well addressed in the questionnaire that there was no need to write their names in the instruction section. Moreover, the interview was conducted by the researcherto maintain anonymity and confidentiality. From its outset, all the respondents were informed about the purposes, methods and time schedule of the study, as it spoils the human relationships and also unethical to conduct research when the participants were unaware of the issue. It was also assured from the very beginning that information obtained from the respondents was held in strict confidence and used for academic purposes only (Creswell, 2012: 23). In any of

the reports, the names and identities of the respondents were not exposed. Privacy of the individuals was well maintained. Hence, the proper coding system was followed which was understood only by the researcher.

4.8.3. Voluntarism

Voluntary participation was another point of consideration in this research. Participants were allowed to stop or withdraw at any point during the process of data collection (Cohen, *et al.,* 2007: 582; Creswell, 2008: 89; 2012: 23; Johnson & Christensen, 2008: 119). It was the full right of the participant to get freedom and self -determination without any restriction and enforcement in the process of research (Cohen, *et al.,* 2007: 52). There was no any kind of coercion to remain as the participant of the study if they are not willing. Respect for the freedom of the respondents, express their own feelings freely and to decide by their own was fully respected. The highest possible ethical codes were followed, and attempts were made not to violate their own rights in each step of the study.

4.8.4. Risk-free interaction

Risk-free interaction with the research participants is the other issue that demands special attention in the process of data collection. In this process, high value and respect were given to the human aspect of the participants. Respondents were not harassed or intimidated socially, physically and emotionally (Johnson & Christensen, 2008: 119). Hence, the phrases and words were well articulated and designed to avoid any risk.

During the time of interview and focus group discussion, permission to record the voices of the participants were requested. This was especially important to obtain the feeling of the respondents and for easy reference during the time of data analysis and interpretation. It also helped to align the results of the interview/FGD with the real contexts of the problem.

4.8.5. Honesty and transparency

Finally, honesty and transparency of the report were other issues in this study. All the sources indicated in the text were also included properly in the reference section. Adequate credit for the authors was given by citing the sources (Creswell, 2012: 24). Attempts were also made to share the results of the interpretation with the participants before its publication, and necessary adjustments were made accordingly. The researcher was not, by any means; try to falsify data so as to substantiate with the basic questions. Both pleasant and unpleasant findings were symmetrically reported as they were in the actual data. As noted by Creswell, (2012: 24) research ethics should be reported freely without the influence of any interest group or individuals. In this regard, trust and high-level professional ethics were kept. It is also possible to verify the collected data both for the quantitative and qualitative aspects from the computer. For this purpose, the data will not be deleted from the computer for at least five years after graduation or publication of the thesis work.

4.9. CONCLUSION

Research paradigm, design and methodology are the important aspects in addressing the research questions raised in chapter one. In this chapter, attempts were made to describe the epistemological and ontological considerations underlying the research. Under this section, the emphasis was given to positivism, constructivism and pragmatism as a philosophy. Positivism has a strong relationship with the quantitative research approach. It strictly follows the dual nature of philosophy by considering reality and mind as two separate entities. The purpose of the quantitative approach is to test the hypothesis by using quantitative data gathering tools like questionnaires. It tries to draw general conclusions, laws and principles that govern the world. On the other hand, constructivism tries to see the world from the specific point of view. It takes into account qualitative data that helps the researcher to view the world from the social, cultural, political, economic and other specific contexts of the individual. It follows the inductive way of constructing knowledge. Lastly, mixed research approach and its philosophy pragmatism were also discussed in this section. Mixed research design integrates both quantitative and qualitative data sets to get a broader understanding of the problem under study.

The rationale for using mixed research design is the integration of these two data sets, which was assumed to yield better results than focusing on monotype of research techniques. Assumptions and challenges of this research method are treated in this chapter. From different mixed research designs, convergent/concurrent/parallel design was employed in this study.

Coming to the population and sampling of the study, all government universities found in the country are divided into three broad categories in relation to their establishments, often called generations. Samples were taken from the first two generations as they were assumed to have better university-industry linkages as compared to the third generation ones. Accordingly, seven universities were included in the study, and respondents from the sample universities were selected based on sample size determination table.

Questionnaires, interviews, focus group interviews and document reviews were used as a method of data collection instruments from academic staffs, department heads, college deans, university-industry linkage offices, the ministry of science and technology, ministry of education, construction, manufacturing and service industries.

Data analysis was made using both quantitatively using numbers and qualitatively by categorising them into themes. Convergent data analysis technique was also employed. Reliability and validity issues were also discussed in this chapter. Finally, ethical issues were parts of this chapter.

CHAPTER FIVE
DATA PRESENTATION, ANALYSIS AND DISCUSSION

5.1. INTRODUCTION

This chapter dwells on the presentation, analysis and discussion of data gathered from the respondents. The findings are presented based on the research questions formulated in chapter one and the theoretical and conceptual framework outlined in chapter two and three. Similarly, presentation and analysis of data were done as per the research design discussed in chapter four. The study employed a mixed research design in which both the quantitative and qualitative data were included.

The data were gathered using survey questionnaires, individual interviews and focus group interviews/discussions. A total of 730 questionnaires were distributed to college deans and department heads, university instructors and prospective graduates found in seven randomly selected government universities of Ethiopia. Specifically, 119, 230, and 381 questionnaires were administered to college deans and department heads, instructors and prospective graduates and the return rate was 99 (83.2%), 200(86.9%) and 316(82.9%) respectively. The overall return rate was 84.2 percent which was statistically acceptable as it is greater than 60 percent which is mostly advised by scholars in the field (Mudy, 2002: 25; Johnson & Owens, n.d.: 132). However, the issue of return rate has remained debatable and 'rule of thumb' than as standard as many publications accept as low as 20 percent (Carley, Hill, Roe, Twiddy, Baxter & Ruppenkamp, 2009: 6).

The analysis was made as per the discussion made in section 4.5.1.and 4.5.2 of the methodology section. Consequently, the first phase of the analysis commences with the presentation of the biographic data of the respondents using percentage and frequency distribution. Following this, the level of management of university-industry linkage, areas of the linkage, benefits accrued from such partnership, challenges and opportunities of the linkage are discussed by both descriptive and inferential statistics using SPSS version 23. From descriptive, frequency and mean were used, whereas, t-test, analysis of variance and factorial analyses were used from inferential statistics in relation to the basic questions raised in chapter one.

To see the existence of perception differences among the respondents, both independent t-test and one way-ANOVA were used for two and three groups of respondents respectively. In both cases, the assumptions of parametric tests like randomisation, normality, and homogeneity of variances were considered (Couch, n.d.: 235 & 272; Wiersma & Jurs, 2009: 413). Moreover, the interpretations were made by considering the Likert scale items as a continuous variable along the continuum which can be treated as interval scales (Willits, Theodori & Luloff, 2016: 30; Carifio & Perla, 2007: 112). Along the continuum, a point on the scale represents an interval than a single point on the line. Accordingly, the guidelines for creating class interval was applied to this study as noted by scholars in the field (Couch, n.d.: 19; Creswell, 2012: 175; Heiman, 2011: 380). Hence, 'Very low' on the Likert scale which is represented by "1" on the questionnaire may range from 0.5 real limits to 1.49, 'Low' from 1.5- 2.49, 'Average' from 2.5-3.49, 'High' from 3.5- 4.49 and 'Very High' ≥ 4.5. For the sake of better understanding, the mean value of ≤ 2.49 was taken as low, between 2.5-3.49 as average and ≥3.5 was interpreted as high in this study.

The second phase dwells on the qualitative results obtained from individual and the focus group interviews. The interview results were obtained from university-industry linkage office heads, Ministry of Education (MoE), Ministry of Science and Technology (MoST), and representatives of the industries. The results were properly transcribed into texts and then developed into themes and categories.

The third section of this chapter is about the integration of both quantitative and qualitative data with its detailed discussions. Finally, the chapter culminates with the development of a model that contributes to the existing body of knowledge so as solve the problems of university-industry linkage in government universities of Ethiopia.

5.2. BIOGRAPHIC DATA

In this section, cross-tabulation of variables related to the backgrounds of department heads, instructors and prospective graduate students are presented. On the first part, three characteristics common to all groups of respondents- College, gender and age are presented and discussed. Following this, characteristics specific to university

managers and instructors like qualification, academic rank and service years in universities were included.

To begin with, Table 5.1 shows the biographic data of respondents in terms of their college, gender and age, which are common to all the three groups of respondents. From a college perspective, 72.7 percent of the respondents were from the Engineering and Technology College while the remaining 27.3 percent were from Business and Economics College. This number was observed among the three groups of respondents with little variation as the sample was taken by considering the 70:30 government strategies of promoting hard sciences to the soft sciences (MoE, 2010: 9; FDRE, 2016: 50). The variation is a bit larger in the case of the students as some of the questionnaires were not returned, or some of them were incomplete so that they were excluded from the analysis.

The second Item in Table 5.1 also presents the gender distribution of the respondents. In all the three groups, the proportion of female students, instructors and managers are by far below their counterparts as they only represent 17.7, 6, and 11.1 percent of the respondents respectively. Of course, this is one major area of the challenge as recent domestic reports on Ethiopian higher education institutions vividly confirms with this data (MoE, 2016: 168). This is linked to the problem of participation of females in the education system as their number decreases as one moves up from primary to tertiary. There are several cultural, social, and economic factors contributing to this, and their participation in the workforce is the reflection of these challenges.

In terms of age, 81 percent of the respondents are within the age category of 20-25 years. In fact, the larger proportion of this group (59 percent) is represented by the students. This is true as the age population for universities range from 19 to 22 or 25years depending on their field of study in the university (MoE, 2016: 152). In relation to this study, students who joined College of Business and Economics may require them to stay at least three years where this may be at least five in the case of Engineering and technology

Table 5.1: Percentage and frequency distribution of respondents by college, gender and age

No	Characteristics		Respondents						**Total N=615**	
			M n=99		**I n=200**		**S n=316**			
			F	%	F	%	f	%	f	%
1	College	Engineering	69	69.3	142	71	236	74.7	447	72.7
		Business and Economics	30	30.3	58	29	80	25.3	168	27.3
		Total	99	100	200	100	316	100	615	100
2	Gender	Male	88	88.9	188	94	260	82.3	536	87.2
		Female	11	11.1	12	6	56	17.7	79	12.8
		Total	99	100	200	100	316	100	615	100
3	Age	20-25	12	12.1	45	22.5	306	96.8	363	59
		26-30	36	36.4	89	44.5	10	3.2	135	22
		31-35	39	39.4	49	24.5	0	0	88	14.3
		36-40	10	10.1	10	5	0	0	20	3.3
		41-45	2	2	5	2.5	0	0	7	1.1
		46-50	0	0	2	1	0	0	2	0.3
Total			99	100	200	100	316	100	615	100

M- Stands for educational managers (College deans and department heads),
I-Represents university instructors, n= number of sample respondents whereas, S- Stands for prospective graduate students

Still, 87.9 percent of college deans and department heads and 91.5 percent of the instructors were below 35 years of age. This implies that the staff is young and which resembles the profile of these two colleges found in the country. Only 12.1 percent of managers and 8.5 percent of instructors were within the age ranges of 36 to 45. This is in contrary to many experienced universities found in different parts of the world, which are suffering from old age faculty members (Abraham, 2016: 1). Despite their ample experiences, aged university professors may lack the energy to stay long in industries to conduct problem-solving researches. However, this is not the case in many Ethiopian government universities.

The other remaining three variables those are specific to university managers and instructors, which were thought to be relevant for this study, were an educational qualification, academic rank and services in the universities. In this regard, it is assumed that the better the qualification, academic rank and services the academic members have, there will be better university-industry linkage. As a result, industries will have better access to university professors who can solve their problems through research.

Table 5.2: Frequency and percentage distribution of respondents by their qualification, academic rank and service

No	Characteristics		Respondents				Total n=299	
			M n=99		I n=200			
			f	%	f	%	f	%
1.	Educational Qualification	BA/BSC	16	16.2	76	38	92	30.7
		MA/MSC	76	76.8	112	56	188	62.9
		MD/PhD	7	7	12	6	19	6.4
		Total	99	100	200	100	299	100
2.	Academic Rank	Graduate Assistant	5	5.1	11	5.5	16	5.4
		Assistant lecturer	11	11.1	65	32.5	76	25.4
		Lecturer	65	65.7	111	55.5	176	58.9
		Assistant professor	13	13.1	8	4	21	7
		Associate professor	5	5	5	2.5	10	3.3
		Total	99	100	200	100	299	100
3.	Service	1-5	48	48.5	132	66	180	60.2
		6-10	44	44.4	53	26.5	97	32.4
		11-15	7	7.1	11	5.5	18	6
		16-20	0	0	4	2	4	1.3
Total			99	100	200	100	299	100

M - Stands for educational managers (College deans and department heads), I - Represents university instructors and n= represents the number of sample respondents

Cognisant of this, the above characteristics were cross-tabulated with these two groups of respondents, and their responses are presented in Table 5.2.

As indicated in Table 5.2, 30.7, 62.9, and 6.4 percent of the respondents were first degree, second degree and PhD holders in order. It can also be seen from the same table that 16.2 percent of managers and 38 percent of instructors were first degree holders. In this regard, it is not difficult to imagine its negative impact on the quality of graduates produced and in creating a link with the nearby industries as they usually favour better qualified and experienced professors who can solve the problems of industries through research. As pointed out by D'Este and Patel, (2007: 1309), the academic status (i.e. being a professor) has a significant and positive impact on the variety of interactions with industry among university researchers. In addition to this, 76.8 percent of managers and 56 percent of instructors were with Master's Degree qualification. It also seems that university guidelines consider the academic qualification of the instructors when offering them a position. Despite this, only 6.4 percent of the respondents have a Terminal Degree-PhD/MD, which may have a great impact again on the university-industry linkage.

5.3. PHASE I-QUANTITATIVE RESULTS

5.3.1. Level of management of university-industry linkage (UIL)

This part of the analysis is divided into two sections. The first part presents views of university managers and instructors at the beginning followed by students view in the second section. The division was made on the ground that university managers and instructors on one hand students on the other were provided with different items in relation to their specific experiences in relation to UIL. Subsequently, the analysis was also made accordingly.

5.3.1.1. Management of UIL: Views of university managers and instructors

For the purpose of this study, management was defined as the process of planning, staffing, organising and decision-making to achieve organisational goals effectively and efficiently (Refer Chapter one, section 1.13). These major functions were considered, and items assumed relevant under each of these functions were designed and administered to different groups of respondents. Therefore, their responses are presented in subsequent sections.

5.3.1.1.1. *Planning as a function of management of UIL*

Every activity of good management commences with planning through the participation of stakeholders in the overall activity of the organisation (Bush, 2007: 2; McNamara, 2009: 66). In this regard, planning is a continuous process, which begins with the assessment of the existing situation, setting directions and priorities, putting activities into practice, and monitoring and evaluation of those activities. It is also assumed as a process of taking courses of actions from a pool of alternatives to achieve organisational goals with minimum wastage of energy, resource and time.

To this end, nine items related to planning were administered to two groups of respondents (Instructors and university managers), and the results of their responses are analysed using independent t-test.

As presented in Table 5.3, Item 5, the level of implementation of plans in relation to university-industry linkage with the grand mean of (M=2.12) was found to be low. The result of t-test $t_{(297)} = -1.809$, p=0.072 for the two groups of respondents indicate that there are no significant perception differences between the two groups of respondents. In other words, they unanimously confirmed that plan implementation of the activities of UIL was not at the expected level.

Similarly, Item 7 of Table 5.3 shows the level at which both universities and industries evaluate the activities of UIL. Accordingly, the mean value (M=2.21) again reveals that the inadequacy of joint programme evaluation so as to bring real change in the management of UIL. Still, the t-test value $t_{(297)} = -0.912$, P=0.363 shows the absence of opinion difference between the two groups of respondents. Concomitantly, developing curriculum jointly (M=2.15) and revising the implemented curriculum jointly by universities and the industries with the mean value of (M=2.16) also show that these two aspects are lacking as compared to other activities presented to the respondents.

M - Stands for educational managers (College deans and department heads), I - Represents university instructors whereas, n= stands for sample respondents

Similarly, the t-test value $t_{(297)} = 0.017$, P=0.986) and ($t_{(297)} = -0.453$, P=0.651) shows the absence of perception differences between the two groups of respondents for

Table 5.3. Independent t-test on the perceived level of planning for UIL by university managers and instructors

No	Items	Respondents	N	Mean	Std. Deviation	Grand Mean	t-test	Sig (2-tailed)
1.	Participates industries on the planning of UIL	M	99	3.35	.92926	3.15	3.408	.001
		I	200	2.96	.94491			
2.	Assesses the existing situation on UIL jointly with industries	M	99	2.63	.97368	2.61	.735	.463
		I	200	2.56	.77421			
3.	Sets common directions(vision, mission, etc.) with industries	M	99	2.56	.82266	2.54	.521	.603
		I	200	2.51	.89099			
4.	Sets priorities with industries in strengthening linkages	M	99	3.00	.79539	2.86	2.803	.005
		I	200	2.72	.82157			
5.	Implements UIL plans with industries	M	99	2.03	.73477	2.12	-1.809	.072
		I	200	2.21	.81010			
6.	Monitor the activities of UIL with the industries	M	99	3.01	1.11112	2.88	2.174	.030
		I	200	2.74	.95759			
7.	Evaluates the activities of UIL jointly	M	99	2.17	.74286	2.21	-0.912	.363
		I	200	2.26	.74346			
8.	Develops curriculum collaboratively with industries	M	99	2.15	.62863	2.15	.017	.986
		I	200	2.15	.76184			
9.	Revise the implemented curriculum jointly with the industries	M	99	2.14	.68527	2.16	-.453	.651
		I	200	2.19	.82716			
	Overall mean for Planning					**2.52**		

developing and revising the implemented curriculum respectively.

On the other hand, participating industries in UIL activities with a mean value of (M=3.15) was rated as an average value. The t-test value ($t_{(297)} = 3.408$, P=0.001) shows the existence of opinion difference between the two groups of respondents. Further *post hoc* analysis result of *Scheffe* test shows that the source of variation was due to a higher mean rating of university managers as compared to instructors. This might be due to the lack of awareness among university instructors in relation to

planning as they may have limited exposure to decisions made at the management level.

Item 4 and 6 of Table 5.3, which tried to rate the perception of respondents in relation to setting priorities in strengthening UIL activities with the mean value of (M=2.86) and monitoring the activities of UIL with a mean value of (M=2.88) indicates average value rating. However, the t-test result $t_{(297)}$ =2.803, P=0.005 and $t_{(297)}$ =2.174, P=0.030 again shows the availability of significant perception differences between university managers and university instructors respectively. The *Scheffe* test of *post hoc* analysis identified that the source of variation was resulted due to managers' high rating as compared to the instructors.

On the contrary, Item 2 and 3 of Table 5.3, shows the average level rating of respondents on assessing the existing situation before planning with a mean value of (M=2.61) and in setting common directions (M=2.54) respectively. The t-test value ($t_{(297)}$ = 0.735, P=0.463) and ($t_{(297)}$ = 2.54, P=0.603) indicates the absence of significant perception differences between the two groups of respondents with respect to those items respectively.

In sum, planning as one major theme to evaluate the level of management of UIL in government universities of Ethiopia administered nine interrelated items to university instructors and managers. The overall mean value (M=2.52) shows that it is little more than the bottom line approaching average value. Hence, it can be said that the level of planning is almost rated as the average value by both the university managers and instructors.

5.3.1.1.2. *Organising as a function of management of UIL*

Organising is another important function of management. It denotes how activities are arranged and distributed to workers in the organisation. It is all about establishing relationships with organisations and within the organisation to achieve organisational goals (McNamara, 2009: 64).

In relation to UIL, especially arranging resources for promoting UIL is vital. Taking this into account, five items related to organising were presented to university instructors and managers to know the level of management of UIL, and to see whether there is a perception difference between the two groups. In line with this, the results of the responses of the respondents were also organised.

Table 5.4: Independent t-test on the level of organising for UIL by university managers and instructors

No	Items	Respondents	N	Mean	Std. Deviation	Grand Mean	t-test	Sig (2-tailed)
1	Organise resources for technology transfer with Industries	M	99	2.07	.59337	2.08	-0.212	.832
		I	200	2.09	.80320			
2	Establishes research and innovation centres with industries	M	99	1.85	.77412	1.87	-.563	.574
		I	200	1.90	.72984			
3	Develops infrastructure (ICT, Offices, etc.) for UIL with industries	M	99	1.74	.64817	1.83	-1.905	.058
		I	200	1.91	.77777			
4	Establishes different technology incubation centres jointly	M	99	1.94	.61971	1.91	.288	.774
		I	200	1.92	.72137			
5	Allocates financial resources for UIL activities Adequately	M	99	3.08	.95487	2.79	4.706	.000
		I	200	2.51	1.00246			
	Overall mean for organising					**2.10**		

M - Stands for educational managers (College deans and department heads),
I - Represents university instructors whereas, n= represents the number of sample respondents

As indicated in Table 5.4, allocation of financial resources for promoting UIL (M=2.79) was rated as moderate level. However, $t_{(297)} = 4.706$, p=0.000 shows the existence of significant perception differences between the two groups. The possible explanation could be there is a significant difference in the mean of two groups, which actually was not the result of sample error. *Scheffe* test for an unequal sample size of *post hoc* analysis for this again shows the source of variation is university managers rate the allocation of resources (M=3.08) higher than that of the instructors (M=2.51) which is little more than average value.

The remaining Items in Table 5.4- organising resources for technology transfer with a grand mean of (M=2.08), establishing common research and innovation centres (M=1.87), developing infrastructures to promote UIL (M=1.83) and the joint

establishment of technology incubation centres (M=1.91) were perceived to be low. In addition to this, to see perception differences between the two groups t-test was conducted and the result shows that there is no significant mean difference between the two groups. In other words, the two groups unanimously perceived that joint organisation of resources between industries and universities were found to be low in government universities of Ethiopia.

5.3.1.1.3. Staffing as a function of management of UIL

As indicated in the second and third chapter of this study, fulfilling industries and universities with the right type of work force will enable both institutions to remain competent in the global world. In relation to this, staffing, which is the process of recruiting, selecting, assigning, training, promoting, appraising and separation of employees (Mc Namara, 2009: 64), plays an important role in promoting university-industry linkage.

As indicated in Table 5.5, university managers and instructors were asked to show how their universities manage issues related to staffing. To this end, experience sharing through training (M=3.14) and exchange manpower through consultancy services (M=3.09) was found to be at moderate level. However, the t-test result for the two items, $t_{(297)} = 4.14$, $p = 0.000$ and $t_{(297)} = 4.69$, $p = 0.000$ shows the existence of a significant difference between the two groups. *Scheffe* test of *Post Hoc* analysis for the result indicates that university managers rated the level of training and consultancy services significantly higher than the mean of university instructors. Despite this, these two items were rated at the average value.

Table 5.5: Independent t-test on the level of staffing for UIL by university managers and instructors

No	Items	Respondents	N	Mean	Std. Deviation	Grand Mean	t-test	Sig(2-tailed)
1.	Jointly fulfils manpower required for UIL	**M**	99	2.41	.88075	2.37	.851	.396.
		I	200	2.32	.83839			
2.	Exchanges experiences through training with industries	**M**	99	3.38	.92259	3.14	4.140	.000
		I	200	2.89	.97917			
3.	Exchanges manpower through consultancy services	**M**	99	3.37	.99577	3.09	4.688	.000
		I	200	2.81	.95674			
4.	Recruitments of individuals jointly with industries	**M**	99	1.78	.73224	1.86	-1.779	.076
		I	200	1.94	.67727			
5.	Assesses the quality of graduates with Industries	**M**	99	2.07	.92860	2.08	-.091	.928
		I	200	2.08	.77887			
	Overall mean for Staffing					**2.51**		

M - Stands for educational managers (College deans and department heads), I - Represents university instructors

Contrary to this, fulfilling the required manpower for UIL (M=2.37), joint recruitment of employees (M=1.86) and joint assessment of the quality of graduates (M=2.08) were found to be low. Similarly, the t-test results for the three items also reveal the conformity of ideas between the two groups. Hence, it is possible to deduce that the level of UIL in relation to staffing fall short of expectation.

5.3.1.1.4. Decision-making as a function of management of UIL

Decision-making is usually perceived as the heart of management. In relation to this study, both university and industry managers are expected to participate in the joint decision process as far as the UIL is concerned. To know the level of decision-making, eight Likert scale items ranging from very high (5) to very low (1) were presented to university instructors and university managers.

From Table 5.6, three items (1, 2, and 6) - setting common agenda for decision making on UIL with the grand mean of (M=2.94), participating industries on decision-making

process (M=2.71) and making a joint decision on research projects (M=3.09) was found to be at moderate level. The t-test value $t_{(297)} = -0.672$, p= 0.502 and$t_{(297)} = 0.855$, p= 0.393 indicates that there is no significant difference between the two groups in setting common agenda for decision-making and actively participating industries in the decision-making processes.

Table 5.6: Independent t-test on the level of decision making for UIL by university managers and instructors

No	Items	Respondents	n	Mean	Std. Deviation	Grand Mean	t-test	Sig(2-tailed)
1.	Sets common agenda for decision on UIL with industries	**M**	99	2.83	1.10694		-.672	.502
		I	200	3.05	3.10826	2.94		
2.	Participates industries actively on decision making	M	99	2.76	1.18744		.855	.393
		I	200	2.65	.93373	2.71		
3.	Considers range of options for decision making on UIL	M	99	2.01	.66232		.492	.623
		I	200	1.97	.66431	1.99		
4.	Chooses from a range of options based on their advantages and disadvantages	M	99	1.96	.68391		-.721	.472
		I	200	2.03	.84419	1.99		
5.	Participate industries on implementing decision on UIL	M	99	1.82	.81270		-1.211	.227
		I	200	1.94	.77055	1.88		
6.	Decides on joint research projects	M	99	3.40	1.03922		5.229	.000
		I	200	2.78	.93594	3.09		
7.	Makes decisions on establishing common research centres	M	99	1.76	.65607		-1.609	.109
		I	200	1.90	.75021	1.83		
8.	Decides on setting priorities in areas of technology transfer with industries	M	99	1.87	.77784		-1.844	.066
		I	200	2.04	.77846	1.96		
	Overall mean for decision making					**2.30**		

M - Stands for educational managers (College deans and department heads), I - Represents university instructors and n= represents the number of sample respondents

However, university instructors have some reservations in relation to doing joint research with industries (M=2.78), while this is (M=3.40) for managers. The t-test result $t_{(297)} = 5.22$, p=0.000) shows the existence of perception differences between the two groups. *Scheffe* test for the *Post Hoc* analysis was also conducted, and the source of variation was observed as the result of high rating of managers. The possible reason could be university instructors were not adequately informed on how the

decision-making process is held between the universities and industries.

On the other hand, considering a range of options during decisions (M=1.99), choosing appropriate options (M=1.99), participating industries on the implementation of decisions (M=1.88), decisions on establishing common research centres (M=1.83) and decisions on technology transfer areas (M=1.96) were again below average. In fact, this confirms with the results obtained in Table 5.4 above. The t-test result for these items also indicates that there is no statistically significant perception difference between the two groups of respondents at $p<0.05$. It is important to note from this empirical data that joint implementation of decisions is lacking between industries and universities. Moreover, decisions on the very vital aspects of UIL like establishing common research centres and working on the technology transfer areas are at its early stage of development. To triangulate this perception, relevant items were also presented to graduating students, and their results will be presented in the following sections.

5.3.1.2. Views of students on the level of management of UIL

During their study in the university, prospective graduates are assumed to have various exposures to industries as course requirements. In line with this, they were provided with sixteen different items relevant to their experience in relation to UIL.

The items were a bit different from the items provided to university managers and instructors as their field of experience, and their responsibility was different. For students, issues related to curriculum planning, the relevance of the courses in relation to industry's demand, their practical exposure with industries, their future job opportunity and so forth were included in the questionnaire and the results of their responses were organised.

As indicated in Table 5.7, students rate creating joint research projects with the nearby industry (M=3.15), arranging experience sharing programmes (M=3.03), launching opportunities for students to exercise practical work (M=2.85), sharing resources (M=2.84) and facilitating conditions to conduct research in industries (M=3.08) at an average value. On the contrary, involving stakeholders during curriculum development

(M=1.8) and offering courses as per the demand of the industry (M=1.90) were also found to be far below the expectation.

Table 5.7: Mean distribution of students' view on the level of management of UIL

No	Items	n	Minimum	Maximum	Mean	Std. Deviation
1	Involves stakeholders from the industry during the curriculum development	316	1.00	5.00	1.79	.62288
2	Offers relevant courses to the demands of the industry	316	1.00	5.00	1.90	.69911
3	Creates joint research projects with the nearby industry	316	1.00	5.00	3.15	1.19085
4	Arrange experience sharing forums with the industry	316	1.00	5.00	3.03	1.29068
5	launch wonderful opportunity for students to exercise practical works in the industry	316	1.00	5.00	2.85	1.26152
6	Offers employment opportunities for university graduates because of strong linkage	316	1.00	5.00	1.80	.66294
7	Provides financial support to strengthen project works in the university	316	1.00	5.00	1.89	.68057
8	agree to share resources with the industry	316	1.00	5.00	2.84	1.15482
9	make use of the research and innovation outputs of the university	316	1.00	5.00	1.92	.67183
10	arranged smooth technology transfer with the industries	316	1.00	5.00	1.90	.62933
11	establish common research centres with the industries	316	1.00	5.00	1.98	.77641
12	leaders commonly set their priorities in increasing linkage with the industries	316	1.00	5.00	1.99	.76214
13	Invites men from industries in different training programmes	316	1.00	5.00	2.02	.68295
14	Establish joint programme evaluation with the industries	316	1.00	4.00	2.11	.70072
15	Arrange opportunities for university instructors to do research in the industries	316	1.00	5.00	3.08	1.18549
16	Arrange award and certification programmes with active industries	316	1.00	5.00	2.08	.74540

N = represents sample respondents

When there is a demand-driven curriculum, the graduates will have better opportunity to join the labour market. Despite this fact, as the supplementary to the above two items, respondents were also asked to rate the existence of employment opportunities to graduates as the result of this linkage. However, students strongly argued against this item (M=1.80) which indicates that there is a rare opportunity for graduates to get employment as the result of UIL.

In addition to the results described above, provision of financial support to conduct research by the industries (M=1.89), making use of research and innovation outputs (M=1.92), smooth technology transfer with the industries and vice versa (M=1.90), and establishing common research centres (M=1.98) also fall short of expectations.

In relation to the management of university-industry linkage again, the competence and vision of leaders have paramount importance in producing quality graduates, conducting problem-solving researches and promoting innovations. Accordingly, students argued whether leaders take UIL as their top priority agenda with the mean value of (M=2.00). This has a huge gap, as the issue of UIL did not get adequate attention from the top-level managers. Other items which were indirectly related to leadership like inviting men from industries during training (M=2.02), joint programme evaluation with the industries (M=2.12) and arranging award and certification programmes with better performing industries (2.10) were also low. By considering the whole Items of Table 5.7, the overall mean of the sixteen items (M=2.27), shows that the level of management of university-industry linkage in government universities of Ethiopia was perceived to be low by the graduate students.

In general, the four management functions considered in this study (planning, organising, staffing and decision-making) attempts were made to determine the level of management of UIL in government universities of Ethiopia. Accordingly, the overall grand mean for planning theme (M=2.52), organising (M=2.10), staffing (M=2.51) and decision-making (M=2.36) were found to be below expectation as pointed out by the university instructors and university managers. To explain further, of the four major functions of management, planning and staffing are relatively at the moderate level while organising and decision-making functions are lagging behind. The overall result shows that (M=2.37) the level of management of UIL in government universities of Ethiopia is low and at its infant stage of development. Comparing this finding with the perception of students, the grand mean for the sixteen items indicated in Table 5.7 (M=2.27), it assures that the level of management of UIL is actually low.

In conclusion, the empirical quantitative data obtained from the respondents (graduating students, university instructors and managers) unanimously confirmed

that the level of management of university-industry linkage is actually low in the government universities of Ethiopia.

5.3.2. Areas of university-industry linkage

The areas of focus of university-industry linkages vary from country to country based on the priorities set by the two parties. Despite these differences, the literature supports linkage in the areas of research and academic support, leadership and management, financing different projects, the establishment of common technology centres, students' apprenticeship and provision of various training services. Considering myriads of areas of linkage, ten major areas assumed relevant for this study were presented to three groups of respondents (managers, instructors and prospective graduates) and their responses are presented.

As indicated in Table 5.8, student's placement or apprenticeship (M=3.66) was indicated as the major area of university-industry linkage. In fact, this item was rated high by all the three groups of respondents. The result of ANOVA ($F_{(612)} = 8.794$, P= 0.000) indicates the existence of significant perception differences among the three groups of respondents. Further analysis of *post hoc* using *Scheffe* test indicates that significant variation was observed due to a low mean rating of students as compared to university instructors and managers. Despite this difference, the average mean for the three groups was found to be high, in the sense that the linkage is strong in the area of students' internship between the universities and the industries.

In addition to student placements, Table 5.8 shows that the linkage between universities and industries are at a moderate level in the areas of providing consultancy services (M=3.14), provision of joint training (M=3.13), and conducting joint research projects (M=3.12).

The result of ANOVA for items 8 and 10($F_{(612)} = .126$, P= 0.882) and ($F_{(612)} = 1.935$, P= 0.145) respectively also shows that there are no significant perception differences in offering consultancy services and provision of joint training. In other words, the three groups confirmed that moderate level existence of linkages between universities and industries in the aforementioned areas.

On the other hand, when universities have better links with the nearby industries, it is assumed that graduates will have better employment opportunities. Contrary to this perceived assumptions, Table 5.8 revealed that direct employment opportunities provided to graduates as the result of thestrong link (M=1.99) were found to be low. The ANOVA result ($F_{(612)} = 3.794$, P= 0.023) pointed out the existence of mean differences among the three groups of respondents. *Scheffe* test of *Post hoc* analysis again indicated that the source of variation is due to the low rating of university managers as compared to university instructors and prospective graduates.

Similarly, the link between universities and industries are also weak in the areas of leadership and management (M=2.31), curriculum development (M=2.44), sponsoring research projects (M=2.33) and establishing common technology centres (M=2.02). The result of ANOVA ($F_{(612)} = 18.033$, P= 0.000) and ($F_{(612)} = 6.558$, P= 0.002) for leadership and management, and curriculum development shows the existence of mean differences among the three groups of respondents. The *post hoc* analysis result also depicts that the source of variation in leadership and management emanates from a relatively higher rating of the university managers while in the case of curriculum development, instructors rated low participation of industries in curriculum development.

Table 5.8: One-way analysis of variance on the areas of UIL

Df = Refers to the degree of freedom; Level of analysis at α= 0.05

No	Items		Sum of Squares	Df	Mean Square	Grand Mean	F	Sig.
1.	Research and academic support areas	Between Groups	10.962	2	5.481	2.50	5.154	.006
		Within Groups	650.788	612	1.063			
		Total	661.750	614				
2.	Leadership and management areas	Between Groups	31.884	2	15.942	2.31	18.033	.000
		Within Groups	541.033	612	.884			
		Total	572.917	614				
3.	Curriculum development	Between Groups	11.948	2	5.974	2.44	6.558	.002
		Within Groups	557.515	612	.911			
		Total	569.463	614				
4.	Joint research projects	Between Groups	19.544	2	9.772	3.12	7.633	.001
		Groups	783.552	612	1.280			
		Total	803.096	614				
5.	Sponsoring research works	Between Groups	1.905	2	.952	2.33	1.192	.304
		Within Groups	489.094	612	.799			
		Total	490.998	614				
6.	Establishment of common technology centres	Between Groups	.173	2	.086	2.02	.112	.894
		Within Groups	472.461	612	.772			
		Total	472.634	614				
7.	Student placements/Apprenticeship	Between Groups	24.799	2	12.399	3.66	8.794	.000
		Within Groups	862.853	612	1.410			
		Total	887.652	614				
8.	Provision of joint training programmes	Between Groups	4.736	2	2.368	3.13	1.935	.145
		Within Groups	748.858	612	1.224			
		Total	753.593	614				
9.	Direct employment opportunities for graduates	Between Groups	6.282	2	3.141	1.99	3.794	.023
		Within Groups	506.716	612	.828			
		Total	512.998	614				
10.	Providing consultancy services	Between Groups	.332	2	.166	3.14	.126	.882
		Within Groups	807.076	612	1.319			
		Total	807.408	614				

ANOVA result for the remaining two items sponsoring research projects ($F_{(612)}$ = 1.192, P= 0.304) and establishing common technology centres ($F_{(612)}$ = .112, P= 0.894) shows that the absence of significant perception differences among the three groups of respondents. This implies that universities and industries have weak

collaboration in jointly sponsoring research projects and establishing common technology centres.

5.3.3. Benefits of university-industry linkage

University-industry linkage has several benefits for both parties. Literature in this area shows that universities benefit from industries by improving the teaching-learning process in line with the ever-growing demand of the market, receiving funds for research and innovation, whereas industries mainly benefit by obtaining up to date technological discoveries so that they become competitive in the global world. In relation to this, ten items in which universities obtain benefits from the industries were designed and administered to the three groups of respondents indicated earlier and their level of agreement was analysed using one way ANOVA. The items presented to the participants were ranging from 5 = strongly Agree to 1 = strongly disagree.

As shown in Table 5.9, development of joint research projects (M=3.31), student placements (M=3.93), provision of joint training programmes (M=3.36), provision of consultancy services (M= 3.26) and identifying areas of training need (M=3.34) were the major areas where Ethiopian universities obtain benefits from the industries. Although the four items indicated above are neutral in relation to the mean values, respondents emphasised with their response in the areas of students' internship. This actually coincides with what was identified in Table 5.8 above.

The result of ANOVA for a joint research project with industries $F_{(2,612)} = 3.093$, $p = .046$ indicates that there are significant mean differences among the three groups of respondents. *Scheffe* test result again indicates that the source of variation is that university instructors' rate lower as compared to the two groups of respondents. This may imply that the participation of university instructors is low in research activities with the industries. This is true on the ground that many African universities are blamed for producing an insignificant number of research outputs.

Table 5.9: One-way analysis of variance on the benefits of UIL

No	Items		Sum of Squares	Df	Mean Square	Grand Mean	F	Sig.
1.	Providing funds for research works	Between Groups	.194	2	.097	2.34	.103	.902
		Within Groups	577.780	612	.944			
		Total	577.974	614				
2.	Leadership and management training	Between Groups	2.196	2	1.098	2.16	1.229	.293
		Within Groups	546.819	612	.893			
		Total	549.015	614				
3.	Curriculum development and revision	Between Groups	.784	2	.392	2.15	.322	.725
		Within Groups	745.541	612	1.218			
		Total	746.325	614				
4.	Development of joint research Projects	Between Groups	7.589	2	3.795	3.31	3.093	.046
		Within Groups	750.843	612	1.227			
		Total	758.433	614				
5.	Establishment of common technology centres	Between Groups	.599	2	.299	1.94	.446	.641
		Within Groups	411.053	612	.672			
		Total	411.652	614				
6.	Student placements/Apprenticeship	Between Groups	18.363	2	9.182	3.93	7.680	.001
		Within Groups	731.630	612	1.195			
		Total	749.993	614				
7.	Provision of joint training programmes	Between Groups	2.558	2	1.279	3.36	.997	.369
		Within Groups	784.743	612	1.282			
		Total	787.301	614				
8.	Direct employment opportunities for Graduates	Between Groups	3.541	2	1.771	1.95	3.158	.043
		Within Groups	343.184	612	.561			
		Total	346.725	614				
9.	Consultancy Services	Between Groups	2.103	2	1.052	3.26	.721	.487
		Within Groups	892.749	612	1.459			
		Total	894.852	614				
10.	Identifying specific areas of their training need	Between Groups	20.623	2	10.311	3.34	7.964	.000
		Within Groups	792.375	612	1.295			
		Total	812.998	614				

Df = degree of freedom F = shows the result of f-ratio; Level of analysis at α= 0.05

Despite its high mean value, students' internship $F_{(2,612)} = 7.68$, p=.001 shows the existence of mean differences among the three groups of respondents. The source of variation mainly due to students' mean rating (M=3.78) is actually below the ratings of university managers and instructors. From this, it is possible to infer that three groups

accepted the existence of relatively strong university-industry linkage in terms of students' apprenticeship. However, low rating of students may be an indicator of the existence of dissatisfaction in its actual practice.

The result of ANOVA for the item providing joint training $F_{(2,612)} = 0.997$, P=0.369 and providing consultancy services $F_{(2,612)} = 0.721$, p=0.487 shows the absence of perception differences in the sense that the benefits obtained from UIL in these areas were rated at a moderate level. In addition to this, joint identification of training demand by both industries and universities $F_{(2,612)} = 7.964$, $p< 0.05$ shows the existence of significant differences among the three groups of respondents. Similarly, *Scheffe* test of *Post Hoc* analysis result shows that the source of variation is due to the high rating of management bodies (M=3.75) which is significantly higher than the mean rating of the two groups. It is possible to deduce from this that, there is a joint identification of training needs between universities and industries. However, there is a communication gap between the specific areas identified between the two parties as perceived by university instructors and prospective graduates.

Contrary to this, government universities in Ethiopia have benefitted less in receiving funds (M=2.34), leadership and management areas (M=2.16), curriculum development and revision (M=2.15), establishing common technology centres (M=1.94) and provision of employment opportunities (M=1.95). In all cases, there are no significant mean differences, except in areas of offering direct employment opportunities $F_{(2,612)} =3.158$, p= 0.043 which shows the existence of significant perception differences among the three groups of respondents. In fact, this finding confirms with what was discussed in Table 5.8 earlier.

Therefore, it is possible to conclude that, university-industry linkage in government universities of Ethiopia is mainly benefitted in student internship, few joint research projects, consultancy services and training areas at a moderate level. On the contrary, this study found out that universities less benefited from industries in receiving funds, leadership and management, curriculum development and establishing common research centres which actually stifled research, innovation and technology transfer capacities of universities which in turn adversely affected the competitiveness of

industries in Ethiopia. To this end, the following section presents the detailed analysis of challenges of UIL in government universities of Ethiopia.

5.3.4. Challenges of University-industry linkage

University-industry linkage has been challenged by several internal and external factors. For the purpose of this study, seventeen variables were identified fromthe various literature and the contexts of the Ethiopian government universities. Accordingly, these variables were administered to three groups of respondents, and the results were analysed using exploratory factor analysis. The analysis was made using SPSS version 23. Exploratory factor analysis uses the principal component analysis, which actually helps to know unknown variable (latent variable).

In this analysis, Eigenvalues which measure variance between factors were determined to be above 1 (one) using KMO sample adequacy and Varmix rotation. Moreover, extraction sum of squared loadings, which shows how much percent, is explained each factor and rotation sum of squared loading was applied to see the variation on three-dimensional plate clearly. Finally, factors were created by deciding the cut point using high homogeneity of variables and taking into account the numerical distance from each variable list. Finally, the name for the latent factor was coined, and analysis was made accordingly.

As indicated in Table 5.10, five principal components obtained from the explained factor analysis. They were considered as latent variables and common names in relation to the study context were coined for each of the variables included in each factor (component). Accordingly, institutional challenges, contextual variation and information gaps, financial and awareness related bottlenecks, work overload and facility related hurdles, and leadership related challenges were identified. Each of these principal components is discussed in the subsequent sub-sections in detail.

Table 5.10: Factor analysis on the challenges of UIL

Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.381	25.772	25.772	4.381	25.772	25.772	2.774	16.318	16.318
2	1.567	9.215	34.987	1.567	9.215	34.987	2.281	13.419	29.737
3	1.407	8.274	43.261	1.407	8.274	43.261	1.752	10.308	40.045
4	1.128	6.638	49.899	1.128	6.638	49.899	1.477	8.690	48.735
5	1.006	5.921	55.819	1.006	5.921	55.819	1.204	7.084	55.819

Extraction Method: Principal Component Analysis.

Only cases for which Deans, Teachers, and prospective Graduates = Respondents are used in the analysis phase.

5.3.4.1. Institutional challenges

As indicated in Table 5.10, one of the major challenges for UIL was found to be institutional challenges related to universities. The result of the principal component analysis identified four variables under this category (See Appendix P). It was found out that lack of internal UIL policy at the university level (0.815), lack of institutional strategy (0.811), problems related to intellectual property rights (0.666), lack of capacity on the parts of university professors (0.646) were categorised under this principal component. The result of factor analysis in Table 5.10 also shows that 16.32 percent of the problems indicated are explained by these variables. The result of extraction sum of squared loading indicates this factor (institutional challenge) as the major challenge that affected UIL with 25.8 percent of the variation.

5.3.4.2. Contextual variations and information gaps

In promoting university-industry linkage, the contexts in which the universities and industries play their role have significant effects. Consequently, the result of factorial analysis identified five variables under this category. Putting them in order, poor communication (0.700), lack of autonomy (0.634), lack of information (0.629), geographical location of industries (0.587), and cultural differences between the academia and the industries (0.505) were categorised under this factor (see Appendix

P). This is actually the second dominant factor that hindered university-industry linkage. Of these five variables, specifically, poor communication among parties was found to be the major pressing factor. As indicated in 5.10, a total of 13.42 percent of variance is explained by this principal component.

5.3.4.3. Financial and awareness related bottlenecks

Proper functioning of university-industry linkage requires a better understanding among the role players (government, universities and the industries). In addition to awareness, finance plays a vital role in promoting knowledge frontiers through research, innovation and technology transfer. To this end, factor analysis was conducted, and the following variables were categorised under this factor- lack of adequate funding (0.806), low understanding about UIL (0.775), and the unwillingness of the local industries (0.483) (refer to appendix P). Detail observations of these variables indicate that how much the variables are interrelated and one affects the other. Lack of adequate funding to UIL, especially on the part of the industries emanate from a low understanding of the issue. As a result, local industries are unwilling to participate in UIL which in turn affected by the capacity of university professors in practically solving the problems of the industries.

5.3.4.4. Work overload and facility related hurdles

From Table 5.10 and appendix (P) again, it is possible to observe that work overload of university instructors (0.628) and lack of well-organised infrastructure (0.643) were another challenges that hindered UIL. Under this principal component, the issue of infrastructure and teaching load of university instructors were reported as challenges at the expense of research, innovation and technology transfer. It is actually assumed that UIL demands adequate time on the parts of university instructors and researchers to conduct the mission of universitiesproperly (especially its third mission). The problem of teaching overload worsened the problem by '*adding salt to the wound'*. Hence, it puts UIL at the disadvantaged position. This factor explains about 8.7 percent of the total challenges explained.

5.3.4.5. Leadership related challenges

In one way or another, leadership actually plays a significant role in promoting university-industry linkage. Leaders at different positions, who are in charge of UIL, have irreplaceable roles to play in promoting the linkage. However, under this principal component, two variables– absence of clear structure that links with the industry (0.490) and lack of supportive leadership (0.423) were found as the major challenges. These two variables explain 7.1 percent of variables as obtained through the rotation sum of squared loadings.

In sum, the result of factor analysis came up with five major principal components. Institutional challenges, contextual variation and information gaps, finance and awareness related bottlenecks, work overload and facility related hurdles and finally, leadership-related challenges. These five principal components explain about 55.82 percent of the total challenges of UIL. Surprisingly enough, the result of factor analysis did not consider lack of policies at the national level as a major problem of UIL. This actually shows the existence of relevant policy platform pertinent to UIL at the national level.

5.3.5. Opportunities to promote university-industry linkage

Opportunities to university-industry linkage can be seen from the perspectives of government, university and the industry. The existing policy platforms and adequate allocation of financial resources will partly determine the success of UIL. In addition to this, the commitment of university leaders and their concern to include UIL as their top priority agenda, their active involvement in facilitating research, innovation and technology transfer are taken as opportunities.

On the other hand, the expansion of industries and their willingness to participate actively in UIL could also be taken as the opportunities. Cognisant of this, nine items were presented to three groups of respondents indicated earlier and their responses are organised.

As indicated in Table 5.11, the existence of policy platforms that supports UIL (M=3.33), universities consideration of UIL as their top priority agenda (M=3.26), the commitment of university leaders to strengthen the linkage (M=3.16) were taken as the opportunity at the moderate level. In addition to this, arranging different training programmes (M=3.07), provision of proper incentives for innovations and patent rights (M=2.97) and allocation of budget for UIL activities by universities (M=2.73) were also considered as the opportunities at the moderate level. Similarly, increasing the participation of universities in consultancy services (M=2.58) was also taken as a moderate level opportunity.

Looking into the results of ANOVA for the three groups of respondents indicated earlier, there are no perception differences among the groups in fair allocation of budget in relation to other university activities ($F_{(2, 612)} = 1.090$, p=.337) between and within the groups. This implies that all the three groups of respondents agree with the idea that there is a fair allocation of the budget by universities to UIL in comparison to other competing activities, which could be taken as an opportunity.

Similarly, the existence of better policy related platforms for promoting UIL was taken as the opportunity at a moderate level. The ANOVA result ($F_{(2, 612)} = .145$, p=.865) shows the absence of perception differences within and among the groups. This proved that there are no such pronounced policy-related problems that hinder UIL. Conversely, there is fertile policy ground that promotes UIL at least on the moderate level. However, this does not mean that it is free of problems at all levels as moderate level opportunity shows that the availability of certain degree of dissatisfaction.

Consultancy services provided from universities to industries was taken as the opportunity with ($F_{(2, 612)} = .354$, p=.702) which shows the absence of significant perception differences among and between groups. However, the participation of universities in providing consultancy services to industries are at the lower boundary of the average value.

Table 5.11: One-way analysis of variance on the opportunities to UIL

No	Items		Sum of Squares	Df	Mean Square	Grand Mean	F	Sig.
1.	There is fair allocation of budget to promote UIL in relation to other activities	Between Groups	2.413	2	1.207	2.73	1.090	.337
		Within Groups	677.239	612	1.107			
		Total	679.652	614				
2.	There is better platform for UIL (clear structure, policy, etc.) at national level	Between Groups	1.284	2	.642	3.33	.145	.865
		Within Groups	2715.048	612	4.436			
		Total	2716.332	614				
3.	Encouraging industries participating in joint consultancies	Between Groups	.526	2	.263	2.58	.354	.702
		Within Groups	455.077	612	.744			
		Total	455.603	614				
4.	Our university plan considers UIL one of its top priority agenda	Between Groups	21.208	2	10.604	3.26	7.344	.001
		Within Groups	883.644	612	1.444			
		Total	904.852	614				
5.	The nearby industries are willing to actively work with the industries on research and technology transfer activities	Between Groups	.153	2	.076	2.03	.116	.890
		Within Groups	402.377	612	.657			
		Total	402.530	614				
6.	There are clear promotion strategies through tax deduction etc.	Between Groups	.031	2	.016	2.05	.025	.975
		Within Groups	378.694	612	.619			
		Total	378.725	614				
7.	There is adequate and clear incentive structure for innovations, patent rights	Between Groups	16.023	2	8.011	2.97	5.717	.003
		Within Groups	857.561	612	1.401			
		Total	873.584	614				
8.	Regular training is given to promote UIL (by Universities, government and industries)	Between Groups	12.127	2	6.063	3.07	3.534	.030
		Within Groups	1050.140	612	1.716			
		Total	1062.267	614				
9.	The leaders at different levels are committed to promoting UIL	Between Groups	8.737	2	4.368	3.16	3.161	.043
		Within Groups	845.676	612	1.382			
		Total	854.413	614				

Df = degree of freedom F = shows the result of f-ratio; Level of analysis at α = 0.05.

Contrary to this, there is significant perception difference among the respondents in relation to universities in considering UIL as its top priority agenda item ($F_{(2, 612)} = 7.344$, p=.001). There is also a significant perception difference on the existence of adequate and clear incentive structure for innovation ($F_{(2, 612)} = 5.717$, p=.003) and the availability of regular training to strengthen UIL ($F_{(2, 612)} = 3.534$, p=.030) among the three groups of respondents. Similarly, the commitment of leaders at different levels to promote UIL ($F_{(2, 612)} = 3.161$, p=.043) actually shows the existence of perception

differences among the groups. Despite this difference, it can be inferred from the explanations above that these items are taken as an opportunity to promote UIL at the moderate level.

On the other hand, respondents argued on the willingness of the nearby industries to work with the universities. The mean value (M= 2.03) for the three groups of respondents show that it is rarely taken as the opportunity to promote UIL. To see the perceptiondifferences among the groups, ANOVA test was conducted, and the result ($F_{(2, 612)} = .116$, p=.890) shows the absence of perception difference among the respondents. Similarly, promoting UIL through tax deduction by the government to industries was rarely taken as the opportunity to promote UIL (M=2.05). In a similar manner, ANOVA result ($F_{(2, 612)} = .025$, p=.975) shows the absence of significant perception difference among the three groups of respondents. Hence, it is possible to deduce from the discussion made so far that lack of willingness of industries to promote UIL and absence of adequate promotion strategy through tax deduction were seldom taken as the opportunity to promote UIL. Consequently, detail strategies proposed by respondents are presented hereunder.

5.3.6. Strategies for promoting UIL

Promoting university-industry linkage requires the active involvement of the key players in the triple helix as indicated in chapter two. Government has the responsibility to lay fertile ground for the adequate platform to strengthen by designing relevant policy frameworks, allocating resources and proper monitoring and evaluating the activities of UIL. Universities are also expected to take the initiative to meet its mission of producing quality graduates that can properly address the felt demand of the market and the economy in general. Consequently, they need proper management of UIL. Conversely, industries also need qualified and skilled graduates to remain competent. They need to solve their problems through innovation and research that could be obtained from the universities. In the previous sections, attempts were made to identify the major problems that hinder the strengthening of UIL in government universities of Ethiopia. As a strategy to alleviate these problems, thirteen items were provided to prospective graduates, university instructors and managers to rate the relevance of particular strategy to solve those identified problems. These items were

divided into four sections for the sake of analysis, and the following sections present these four themes in detail.

5.3.6.1. Bridging policy and practice gaps

Bridging policy and practice gap was taken as one major strategy to promote UIL. In relation to this, respondents were requested to rate whether UIL is supported or not by the relevant legal framework at different levels. In addition to this, encouraging universities to participate in UIL through a tax deduction, provision of adequate funding and increasing the practical engagement of students in industries were provided to respondents, and the result is presented in Table 5.12.

Table 5.12: One-way analysis of variance on bridging policy and practice gaps

NO			ANOVA test					
	Items		Sum of Squares	Df	Mean Square	Grand mean	F	Sig.
1.	Support UIL with legal framework at different levels- both at university and industry	Between Groups	14.943	2	7.472	4.11	8.432	.000
		Within Groups	542.315	612	.886			
		Total	557.259	614				
2.	Encouraging industries participating in UIL through tax deduction	Between Groups	2.408	2	1.204	4.17	1.836	.160
		Within Groups	401.342	612	.656			
		Total	403.750	614				
3.	Provision of adequate funding for university-industry linkage	Between Groups	29.529	2	14.765	3.95	15.720	.000
		Within Groups	574.806	612	.939			
		Total	604.335	614				
4.	Increasing practical engagement of students in the industry	Between Groups	43.710	2	21.855	4.04	24.484	.000
		Within Groups	546.274	612	.893			
		Total	589.984	614				

Df = degree of freedom F = shows the result of f-ratio; Level of analysis at α = 0.05.

As portrayed in Table 5.12, Item 1, respondents were requested to rate the relevance of supporting UIL with the legal framework as a strategy to promote UIL. The result of their rating with (M=4.11) shows that applying legal enforcement to promote UIL was suggested as an important strategy in strengthening university-industry linkage. However, the result of ANOVA reveals $F_{(2, 612)} = 8.432$, $P<0.05$) the existence of significant opinion differences between and within the groups. To see the source of variation, *Scheffe* test of *post hoc* analysis was conducted, and the variation exists between the means of university managers and Instructors on the one hand and

between the means of prospective graduates and university managers on the other. In other words, the difference is due to the high rating of university managers as compared to others.

Similarly, Item 2 of Table 12 shows the applicability of deducting taxes from industries as a strategy for promoting UIL. The grand mean value (M=4.17) shows that the respondents believe that reducing taxes from industries who are actively participating in UIL was assumed to strengthen the linkage. In the same vein, $F_{(2, 612)} = 1.836$, $P > 0.05$) shows the absence of significant opinion differences among the groups. This implies that the three groups unanimously agree that motivating industries who actively participate in UIL through tax deduction will increase the linkage.

The other two Items (3 and 4) indicated in Table 5.12 also show that the application of these strategies will promote UIL. Specifically, provision of adequate funding for UIL with a grand mean (M= 3.95) shows the relevance of this strategy to a higher level. In relation to this Item, the result of ANOVA $F_{(2, 612)} = 15.720$, $P < 0.05$) illustrates that the existence of opinion differences among the three groups of respondents. Referring to the result of *post hoc* analysis, *Scheffe* test explains that the variation exists between managers and instructors on one line while variation avails between university managers and prospective graduates on the other. A close look at the results of descriptive statistics demonstrates that the difference was observed due to a high mean rating of university managers.

The fourth Item of Table 5.12, also shows that increasing practical engagement of students in the industry with the grand mean value of (M=4.04) indicates, this strategy could also be cited as the major strategy of promoting UIL. Despite this high mean value, there is opinion difference among the three groups of respondents with ($F_{(2, 612)} = 24.484$, $p < 0.05$). The result of *post hoc* analysis, Scheffe shows the existence of perception differences between university managers and instructors on one string while between the university managers and prospective graduates on the other. Similar to item 3 of the same table, the variation exists as the result of high mean rating of university managers.

5.3.6.2. Advertising and sensitising UIL programmes

In strengthening UIL, acknowledging and publicising its activities could be taken as strategies to promote it. Awarding and acknowledging better performing industries will encourage them to participate in the linkage actively. Similarly, motivating and rewarding actively engaged academicians and industry managers will be assumed to strengthen the link. Moreover, sensitisation through various training programme is also taken as the strategy to promote university-industry linkage. To this end, three items were presented to three groups of respondents, and their responses were analysed.

As portrayed in Table 5.13 Item 1, arranging different training programmes both by the universities and industries with a mean value of(M=3.97) shows high value implying that the relevance of providing different training programmes was identified as a strategy to promote UIL. The result of ANOVA $F_{(2, 612)} = 18.752$, $p < 0.05$ shows the existence of significant opinion differences among the groups. The result of *Scheffe* test for *post hoc* analysis explains that the source of variation is between university managers and instructors on one string and between university managers and prospective graduates on the other. Again, the source of variation is due to the high rating of the university managers as compared to instructors and students.

Item 2 of Table 15.13 again shows the relevance of publicising and acknowledging good experiences of UIL through national forums. The grand mean value for the three groups of respondents (M=4.24) shows the highest mean value compared to other items under the same category. On the contrary, the result of ANOVA $F_{(2, 612)} = 13.355$, $p < 0.05$) shows the availability of opinion difference among the groups. The source of variation again was observed between university managers and instructors on one line and between university managers and prospective graduates on the other.

Table 5.13: One-way analysis of variance on publicising and sensitising UIL programmes

No	ANOVA test result							
	Items		Sum of Squares	Df	Mean Square	Grand Mean	F	Sig.
1	Arrange different training programmes both by the university and the industry	Between Groups	40.165	2	20.082	3.97	18.752	.000
		Within Groups	655.419	612	1.071			
		Total	695.584	614				
2	Publicise and acknowledge good UIL programmes in national forums	Between Groups	16.805	2	8.403	4.24	13.355	.000
		Within Groups	385.058	612	.629			
		Total	401.863	614				
3	Motivate and award better performing academicians and industry managers who are promoting UIL	Between Groups	8.040	2	4.020	4.08	4.173	.016
		Within Groups	589.563	612	.963			
		Total	597.603	614				

Df = degree of freedom F = shows the result of f-ratio; Level of analysis at α = 0.05

Similar to Item 1 of Table 5.13, the source of variation is due to the highest rating of university managers compared to the other two groups. This implies that recognising and publicising better performing industries in national forums could be taken as the major strategy to promote UIL at the national level by the university managers, which is actually lacking in the current practice.

Lastly, Item 3 of Table 5.13 vividly shows that motivating and awarding better-performing managers and academicians were found to be another important strategy to improve UIL. The mean value (M=4.08) shows the high value implying that the relevance of this strategy in improving UIL is high. The result of F ratio ($F_{(2, 612)} = 4.173$, $p < 0.05$) shows the existence of significant opinion differences between the groups. *Scheffe* test of *Post hoc* analysis indicates that the variation exists between university managers and prospective graduates. Similarly, the variation again is due to the higher rating of university managers when compared to other groups.

5.3.6.3. Networking

Well-organised university-industry linkage requires properly designed networking. The issue of networking is more crucial than ever in this global world. In line with this study, it refers to the linkage between universities and industries, inter-industries and with the governments in a broader sense. This may include both local and international networking. Specific to this study context, items related to resource share (both human and material) exchange, three items were presented to respondents to know their relevance to promote UIL. The results of the respondents' response are presented in Table 5.14.

Table 5.14: One-way analysis of variance on creating network as the strategy to promote UIL

No	Items		ANOVA test Result						
			Sum of Squares	Df	Mean Square	Grand mean	F	Sig.	Sig.
1	Building common research centres that promote UIL	Between Groups	10.365	2	5.183	3.88	5.133	.006	.000
		Within Groups	617.970	612	1.010				
		Total	628.335	614					
2	Encourage staff exchange programmes	Between Groups	12.795	2	6.398	3.95	5.946	.003	.001
		Within Groups	658.434	612	1.076				
		Total	671.229	614					
3	Increase the availability of laboratories, research centres etc. for UIL	Between Groups	12.766	2	6.383	3.9	6.012	.003	.160
		Within Groups	649.780	612	1.062				
		Total	662.546	614					

Df = degree of freedom F = shows the result of f-ratio; Level of analysis at α = 0.05.

Item 1 of Table 5.14 presents whether building common research centre should be taken as the strategy to promote university-industry linkage or not. The grand mean value (M=3.88) shows that it is greater than the average mean value indicating that it can be taken as a strategy to strengthen the linkage. In other words, it can serve as a network through which both universities and industries communicate, and interaction a continuous basis. However, the result of ANOVA $F_{(2, 612)} = 5.33$, $p < 0.05$) indicates

the existence of significant perception differences among the groups. By referring to the result of *Scheffe* test, the source of variation was exhibited between university managers and instructors on one string and university managers and prospective graduates on the other. A detailed look at the means, the source of variation still rests on the high rating of university managers when compared with that of the university instructors and students.

The 2 Item of Table 5.14 again shows the extent to which staff exchange programmes are relevant in promoting university-industry linkage. Accordingly, the mean value (M=3.95) shows the high mean value that, this strategy is relevant to promote UIL. Actually, staff exchange programmes widen the opportunity for university researchers and academicians to involve actively in research and innovation activities. Similarly, it opens the opportunity for the 'would be' employees to test the practical world, beyond the theoretical knowledge that is provided by the university. On the other hand, it paves the way for industries to exploit the knowledge generated in the universities, which will help them to be competitive in the international market. Despite this, the result of ANOVA $F_{(2, 612)} = 5.946$, $p < 0.05$) shows the existence of opinion differences among the three groups of respondents. Further analysis of *Scheff*e test indicates that the source of variation lies between university managers and university instructors on one string and between prospective graduates and university managers. Again, the source of variation rests on the high rating of university managers as compared to the other remaining two groups.

Lastly, Item 3 of Table 5.14 presented the relevance of building common resource centres like laboratories and research centres to improve university-industry linkages. In relation to this, the mean value (M=3.9) is greater than the average value. This illustrates that it is quite relevant to have resource centres to strengthen the linkage. The result is almost similar to Item 1 of Table 5.14 as the aim was to counter check the responses of the respondents. The result of F-ration ($F_{(2, 612)} = 6.012$, $p < 0.05$) indicating the existence of significant perception differences among the groups. Further analysis of *post hoc* using *Scheffe* test indicates that the source of variation was again due to university managers' higher rating. The difference is significant between the means of university managers and university Instructors on theone hand and between prospective graduates and university managers on the other.

Hence, the presentation and interpretation of data made from Table 5.14 that linking universities through strengthened human and material resource share were suggested as a strategy to promote UIL. Still more, it is possible to deduce that strong networking inter-universities and with industries will strengthen the opportunity for both parties to remain competitive and innovative.

5.3.6.4. Building trust and shared vision

Above all, trust and shared vision is the cornerstone for promoting UIL. This actually depends on the role of both university and industry managers in committing themselves to participatory decision-making activities. Trust will also be developed on building a sense of ownership by the two parties to contribute to the economic development of the country. Shared vision is also built through sustained participation in different affairs of UIL. In relation to this study, three items were offered to respondents on the issue of joint curriculum development, joint recruitment of professors and involving industry managers as board members of the university and the results are shown in Table 5.15.

Table 5.15: One-way analysis of variance on building trust and shared vision to promote UIL

NO	Items		ANOVA Test Result					
			Sum of Squares	Df	Mean Square	Grand Mean	F	Sig.
1.	Designing curriculum in relation to UIL	Between Groups	12.570	2	6.285	3.98	7.004	.001
		Within Groups	549.195	612	.897			
		Total	561.766	614				
2.	Arranging conditions for joint recruitment of research professors	Between Groups	9.168	2	4.584	3.77	3.935	.020
		Within Groups	712.962	612	1.165			
		Total	722.130	614				
3.	Participating industries representatives as university board members	Between Groups	24.599	2	12.300	3.89	11.170	.000
		Within Groups	673.882	612	1.101			
		Total	698.481	614				

Df = degree of freedom F = shows the result of f-ratio; Level of analysis at α = 0.05.

Table 5.15, Item 1, tries to rate the relevance of curriculum as a strategy to promote UIL. Curriculum irrelevance was one major area of challenge in strengthening UIL. In other words, what students learn in the universities is not adequately addressing the

demands of the market in general and that of the industries in particular. Cognisant of this, respondents were requested to rate the relevance of this strategy to promote UIL. The mean value (M=3.98) shows that this strategy is very important to enhance the link as this value is greater than the average mean value. In another way round, the current curriculum, which is underway, lacks relevance to the demands of the industry. Hence, it requires the active involvement of both parties to revise so that it can serve their common purposes.

The result of ANOVA $F_{(2, 612)} = 7.004$, $p < 0.05$) shows the availability of opinion difference between three groups of respondents. To see sources of variation, *Scheffe* test was conducted, and the result shows the variation avails between university managers and prospective graduates. A close look at the source of variation again, it is due to the higher rating of university managers. Despite this variation, one can easily understand that designing a relevant curriculum that addresses the demands of both universities and industries, can promote creativeness and problem-solving capacity graduates; consequently, it was suggested as the strategy to promote UIL.

Arranging conditions for joint recruitment of research professors as indicated in Table 5.15, was also taken as an attempt to build trust and shared vision for UIL. The grand mean value (M=3.77) is greater than average value considered for analysis. This implies that employing individuals who are working both in the universities and in industries enhances the ties between the two. Communication gaps between the two parties can easily be bridged. Moreover, it is possible to identify priority areas of research and innovation areas so that landmark to trust and shared visions will also be laid. The result of ANOVA $F_{(2, 612)} = 3.935$, $p < 0.05$) portrays the existence of perception differences among the three groups of respondents. The variation exists between the mean rating of university managers and prospective graduates. Despite this variation, the three groups of respondents concomitantly agree that conducting joint recruitment of professors/researchers by both the universities and industries could be taken as a strategy to promote UIL. The relevance of this strategy has paramount importance in countries like Ethiopia where there are serious shortages of professors and researchers.

The last Item of Table 5.15 presents the relevance of participating industry managers as a board member of universities. Accordingly, the mean value (M=3.89) shows that it could be taken as a relevant strategy to promote university-industry linkage in government universities of Ethiopia. In other words, participating industry representatives in various affairs of university activities was assumed to strengthen the linkage. As the result of such participation, university management bodies could better create a partnership with the industries in the areas of research, capacity building, consultancy services, and resource share and technology transfer activities.

However, the result of ANOVA $F_{(2, 612)} = 11.170$, $p < 0.05$) indicates the existence of opinion difference among the groups. The result of *post hoc* analysis using *Scheffe* test reveals that significant mean variation was observed between university managers and instructors on one pair and between prospective graduates and university managers on the other string. As usual, the result of mean variation is due to the high rating of managers as compared to others. This may be due to the value that university managers gave due emphasis to the importance of shared leadership which will make the partnership between universities and industries smooth and knowledge-based. Therefore, it is possible to infer from this that participating members from industry in university management could be taken as a strategy to promote UIL, which may lay the foundation for building commitment, and shared vision.

5.3.7. Interpretation of quantitative data

This study attempted to explore how university-industry linkage is managed in government universities of Ethiopia. In this regard, four basic management functions that were assumed relevant for UIL; namely, planning, organising, staffing and decision-making activities were considered to determine the level of management of UIL. In planning, both universities and industries have some joint discussions at the moderate level. However, the level of implementation of plans was found to be low. Similarly, joint development and implementation of the curriculum were also low.

This implies that the activities of university-industry linkage lack adequate attention in putting the designed plans into action that in turn adversely affects the quality of the graduates (Refer also section 3.7.4. & 3.7.6). However, experience shows the

importance of joint planning and implementation of UIL activities will help to remain at competitive stage in the global market both in terms of knowledge production and technology transfer (Hiwote, 2014: 60; Derbew, Mungamura, Asnake, 2015: 73; Abdu, 2013: 133 & 153; D'Este & Patel, 2007: 1310; Ahmed & Jumani, 2013: 201).

The quantitative data also showed that organising resources for technology transfer, establishing common research and innovation centres, developing infrastructure to promote UIL and establishment of technology incubation centres were found to be low. This finding confirms with what was identified by (Abdu, 2013:153). Despite this, it is assumed that the establishment of different centres and facilitated infrastructure will open a fertile avenue for university-industry linkage. Moreover, Ethiopian government universities lack joint recruitment of employees with the industries. Similarly, the linkage could not bring the opportunity to assess the quality of graduates in line with the emerging economy of the country leaving them unemployed or underemployment (Ssebuwufu, *et al.,* 2012: 12; Nyerere, 2013: 2; Tumuti, *et al.,* 2013: 27; Edmondson, *et al .,* 2012: 6). Consequently, the system was suffering from producing unfit graduates to the demands of the domestic labour-market in particular and the global economy in general (Abraham, 2013: 62; Khan & Anwar, 2013: 270). This was witnessed as the result of lack of putting joint decisions to practice by both parties. Briefly, the level of management of university-industry linkage was at its early stage of development in terms of joint planning, organising, staffing and decision-making. This was explained by limited employment opportunities to university graduates, shortage of facilities, and other issues related to university-industry linkages.

On the other hand, university-industry partnerships may take several forms like contract research, consulting, licensing, private-funded university institutes or chairs, joint university-industry research centres, and research consortia (Guimon, 2013: 2; Ahmed & Jumani, 2013: 209; Abdu, 2013: 151). However, this study found that student internship, consultancy, training and conducting joint research projects are the major areas of linkage in government universities of Ethiopia. On the contrary, university graduates did not receive adequate employment opportunities as the result of such linkages. Universities did not get sufficient support from the industries in the areas of leadership and management, curriculum development, sponsoring research projects and establishing common technology centres. This makes the linkage between the

two parties' unidirectional limiting universities to producing incompetent and unskilled graduates on the one hand and deterring industries from using up to date research based university knowledge. This, in turn, has a far-reaching implication on the future economic development of the country.

Similar to the above discussions, university-industry linkages in Ethiopian government universities were dominated by students' practical attachment to the local industries. Hence, universities benefitted their graduates through this practical attachment to some extent. In addition to this, both parties benefitted from joint research projects, capacity building and consultancies provided. However, the benefits were minimal in terms of receiving funds from industries, leadership and management, curriculum development and revision and establishing common-avenue for technology innovation and technology transfer.

University-industry partnerships with government universities of Ethiopia were suffering from several institutional challenges. Universities specifically lack internal policies and strategies in relation to UIL. Moreover, there is no clear strategy to manage intellectual property rights (IPR) at the university level. University professors and instructors again lack adequate practical skills to solve the problems of the industries. The quantitative result of this study indicated that institutional challenges are more pressing than other challenges. Similarly, different studies conducted domestically and in other developing nations of the world confirm this finding (Hiwote, 2014: 59; Altbach, 2011: 7; Abraham, 2016: 1; Adeoti, 2009: 375).

Contextual variations and information gaps were also the other caveats to UIL. Poor communication between universities and the industries, lack of autonomy, lack of information, geographical location of industries, cultural differences between the industries and the academic world has become the challenge to proper UIL. Similarly, finance and awareness related problems, work overload and facility related bottlenecks, and lack of committed, and supportive leadership were found to be the challenges to the UIL.

Despite the above challenges, the university-industry linkage has some promising opportunities (Derbew, Mungamura, Asnake, 2015: 74). On the part of the

government, availability of policy platforms was taken as the opportunity. On the other hand, the expansion of universities and industries was also taken as the opportunity to promote UIL in the country. To overcome the above-identified challenges, this study found that bridging policy-practice gaps, promote through advertising and sensitising programmes, networking, building trust and shared vision wereidentified as the strategies to promote UIL in government universities of Ethiopia.

5.3.8. Conclusion of the quantitative results

In promoting university-industry linkage, the qualification, academic ranks and services of the university instructors and manager have a greater impact. However, the educational qualification of university instructors was dominated by Master's Degree holders or below. Still, a significant number of instructors were first degree holders offering courses at the university level. This was exacerbated by lower years of services at the university as 60.2 percent of the instructors have experience of fewer than five years.

In addition to the above results, the level of management of university-industry linkage was found to be low in government universities of Ethiopia. This was explained by their level of planning, staffing, organising, and decision-making activities. The overall mean of these major areas of reference (M=2.27) actually showed that its level of management was low, especially, in the areas of joint decision-making and organising. This was confirmed by the three groups of respondents (students, university instructors and managers).

The quantitative result also showed the areas of UIL in government universities of Ethiopia. Of all areas of UIL indicated both in the literature and used in the data gathering instruments, students' internship was identified as the major area of the linkage. This was followed by consultancy services, provision of training and conducting joint research projects. On the contrary, UIL is at its infant stage in the areas of providing employment opportunities to graduates, leadership and management areas, curriculum development, sponsoring research projects and establishing common technology centres.

Universities benefitted from the nearby industries in student internships, provision of joint training programmes and consultancy services. However, the benefits obtained so far were not satisfactory. Receiving funds from industries, leadership and management support, curriculum development and revision, establishing common technology centres and offering employment opportunities to graduates were areas where there was less attention in comparison to others.

The quantitative analysis also pointed out the challenges of UIL. The result of the principal component analysis identified institutional challenges, contextual variation and information gaps, finance and awareness related bottlenecks, work overload and facility related challenges, and leadership related issues as the major hurdles to UIL.

On the other hand, the quantitative data analysis also tried to explore the existing opportunities to strengthen UIL. Accordingly, the result showed that the existence of supportive policy platforms by the government, increased concern for UIL by the universities and the expansion of industries in the country was sought as the opportunity to strengthen UIL. This was taken as one major mechanism to realise the development needs of the country.

To overcome the challenges indicated so far, various assumed strategies were also provided to the study participants, and the result revealed that bridging the policy-practice gap was identified as the major strategy. In addition to this, increased awareness through publicising and sensitising programmes, creating strong networking with the industries and inter-universities both domestically and internationally was suggested by the study participants. Above all, the quantitative result indicated building trust and shared vision as the strategy to promote UIL. Under each of these variables, several factors were discussed in detail.

5.4. PHASE II- QUALITATIVE FINDINGS

5.4.1. Biographic data of qualitative data participants

In this phase, data collected through interview and focus group discussions are thoroughly analysed and interpreted. Data were gathered from UIL office heads of

seven sample universities, three high-level experts of MoST and MoE. Moreover, some 13 interviewees from sample industries (8 from both construction and manufacturing, and five from service industries) were included in the study. In the interview, 23 interviewees took part in the study. Finally, two focus group discussions/interviews were conducted with university alumni, which contain six members each. A total of 35 study participants were included in the study, and their backgrounds are outlined in Table 5.16.

Table 5.16 shows the biographic data of interview and focus group discussion participants. In terms of sex, of the total 35 study participants, 29 (82.9 percent) were male whereas the remaining 6 (17.1 percent) were females. Age wise, 25 (71.4 percent) of the study participants were less than or equal to 40 years. This implies that they are mostly in their most productive age in promoting university-industry linkage. The rest 10 (28.6 percent) were older than 40 years of age.

Table 5.16: Percentage and frequency distribution of interview and focus group discussion participants by sex, age, qualification and services

Item	Interview Participants			FGD Participants		Total	
		F	%	F	%	F	%
Sex	M	20	87	9	75	29	82.9
	F	3	13	3	25	6	17.1
	Total	23	100	12	100	35	100
Age	20-25	-	-	-	-	-	-
	26-30	-	-	3	25	3	8.6
	31-35	3	13	6	50	9	25.7
	36-40	10	43.5	3	25	13	37.1
	41-45	7	30.5	-	-	7	20
	46-50	3	13	-	-	3	8.6
	Total	23	100	12	100	35	100
Qualification	BA/BSC/BED	5	21.7	5	41.7	10	28.6
	MA/MSC/MED	15	65.2	7	58.3	22	62.9
	MD/PhD	3	13	-	-	3	8.6
	Total	23	100	12	100	35	100
Service	1-5	7	30.5	8	66.7	15	42.6
	6-10	12	52.2	4	33.3	16	45.7
	11-15	3	13	-	-	3	8.6
	16-20	1	4.4	-	-	1	2.8
	Total	23	100	12	100	35	100

Other important characteristics of study participants considered for this study were educational qualification and their service in their current organisations. Accordingly, 10 (28.6 percent), 22(62.9 percent) and 3(8.6 percent) of the study participants were first, second and third-degree holders respectively. In terms of service, 31 (88.3 percent) of the interview and focus group participants have served one to ten years in their current organisation. Consequently, from the distribution observed the participants could provide relevant information pertinent to UIL as per their contexts.

5.4.2. Development of themes and categories

Themes and categories were developed based on the aims of the study indicated in chapter one section 1.4 and the basic questions of section1.3 from the interview and focus group discussion data. The general aim of the study and the theoretical framework outlined in chapter two helped the researcher to develop themes and categories. For better understanding, Table 5.16 shows the summary of Themes, categories and subcategories.

Table 5.17: Summary of themes and categories

THEMES	CATEGORIES
STATUS OF MANAGING UNIVERSITY-INDUSTRY LINKAGE	Status of managing university-industry linkage
AREAS OF UNIVERSITY-INDUSTRY LINKAGE	Students' Internship
	Research, Consultancy and Training
	Improving Teaching-learning process
	Resource share
BENEFITS OF UIL	Practical exposure
	Financial support
	Capacity building
	Research and consultancy services
	Entrepreneurial and skill development
	Resource share
CHALLENGES RELATED TO UIL	Policy-practice gaps
	Lack of trust and commitment
	Financial related challenges
	Reluctance of the local industries
	Institutional challenges
OPPORTUNITIES FOR PROMOTING UIL	Exposure to practical world
	Government attention

	Growing industries
STRATEGIES TO PROMOTE UIL	Motivation and legal enforcement
	Practical engagement in problem-solving
	Pollicisation and sensitisation programmes
	Clear structure
	Strengthening Monitoring and evaluation system

5.4.3. Status of managing university-industry linkage

As indicated earlier, managing UIL requires participatory planning, implementation and evaluation of activities. This calls for joint identification of problems and prioritising of activities to be accomplished by both universities and the industries. In relation to this, the level to which university managers give emphasis to UIL matters worth. Their commitment could be evaluated in terms of allocating resources to implement the activities of UIL properly. Here, the crux of the matter lies in the ability of managers to organise resources, making decisions and following up the activities of UIL on a continuous basis. The result of the interview revealed the existence of planning for UIL by both universities and the industries. Nevertheless, this planning lacks coordination and common understanding as the two parties plan independently of one another. In strengthening this interviewee (UILO, #5) states:

> *We have relationships with the industries in different areas. Our university plans its' own and the industries will do the same for themselves. After seeing the interests of two parties, Memorandum of Understanding (MoU) will be signed based on the opportunities and challenges identified. The initiative could be from both sides. However, there is no plan commonly set by the U & I. The major problem is joint planning is lacking.*

As indicated in the interview, it is possible to confirm the availability of UIL. On the other hand, both universities and industries plan their own activities with less participation and consultation with one another. Besides, universities mostly take the initiative and memorandum of understanding (MOU) was signed based on the opportunities and challenges identified. The absence of joint planning will jeopardise prioritising areas of focus, which may result in poor performance of UIL. In confirming

this, interviewee (UILO, #6) added that “the industries did not actually participate in the planning process. However, there were joint forums and discussions”. Even in cases of joint planning, the commitment to implement plans jointly was found to be poor. Another interviewee confirmed this by saying:

> *There is joint planning with some 10 different industries organised by the ministry of science and technology. However, actual implementation is poor. Even in curriculum development, the participation of the industries is very low. I think this is the case why this gap exists. Probably the skill gap observed among the graduates is the manifestation of this problem (UILO, #3).*

From the quotation, it is possible to infer that Ministry of Science and Technology (MoST) arranged a joint forum to plan for UIL. Despite this, the respondent argued that the actual implementation is disappointing. Their participation in joint curriculum development was also found to be weak (UILO, #6). It was also indicated that quality of graduates became questionable as the result of a mismatch between the skill required of graduates and the actual skill that the graduates possess. This has a far-reaching implication on joining the job market, as the graduates did not acquire necessary skills required for employment. From this, one can easily infer that joint planning between universities and industries was lacking. In areas where there are attempts to plan jointly, the most important aspect of planning-putting plans into action was found to be weak. Interviewees from the industry also share the same view in this regard (IO, #1 & IO, #3, MoE, #1).

Another important aspect of management of university-industry linkage is issues related to organising. In its different policy frameworks, the government of Ethiopia has put several strategies and guidelines to make UIL more effective. However, the emphasis given to UIL varies from one university to another. In some sample universities, the organisation of UIL is well-coordinated at the top level of the university while this did not go to the college and the department levels. In relation to this, the response of the interviewee is worth mentioning:

> *Interims of organising, there is a platform that links the university with the industry. At the university level, there is a well-structured office lead by the scientific director. However, the structure is lacking at lower layers of the university-at college and department levels. It is limited to the central level (UILO, #5).*

As indicated in the quotation, there is the fertile ground for organising human, material, financial and other resources to link with the industries. Most of the sample universities structured UIL offices under the scientific director who is in turn accountable to research and technology transfer vice presidents. In some cases, however, this structure is not linked to colleges and departments. This limits the decision-making power of the departments and colleges, which may actually deter the participation of lower tiers of the university in UIL activities.

Contrary to the above well-established structures, some UIL offices were not adequately staffed with an adequate number of personnel and resources. Interview with UILO of one of the sample universities reads:

> *I am the only person in this office. It lacks a person who is in-charge of coordinating student internship. It needs to be filled with the required number of personnel like secretaries. This will add burden to the office head spending most of his activities on some clerical and routine works at the expense of strategic issues (UILO, #3).*

From this one can understand that the office of UIL is not well organised in some cases. The issue of UIL is limited to coordinating students' internship. Consequently, the manager of UIL could not give proper attention to the major issues of the office.

In relation to staffing, staff exchange between universities and industries has a strong contribution to the linkage. However, inviting professionals from industries to provide courses for university students and sending university instructors to industries for further skill development is limited. In proof of this:

> *This year, there is a plan to invite men from industries to provide courses in the university. Despite this, there is no actual practice on the ground. Moreover, there is a plan to send our staff members to the industries for externship (UILO, #2).*

Staff exchange programmes between universities and industries were at its planning stage. The actual practice is lacking, and there is a plan to send staff members to the industries for the externship. Hence, it can be confidently said that it is in its initial stages of development.

The other point that warrants special attention in relation to UIL is the allocation of budget. The respondents contend that there was no such major problem in allocating budget to UIL. In support of this, interviewee (UILO, #5) indicated that "--- in our university, as far as the request from the UIL is reasonable, we are provided with the budget we planned. Therefore, there is no such pronounced problem in relation to this." Other interviewees also indicated the hierarchical allocation of budget to UIL from the scientific director office. The interviewee explained:

> *There is no such budget directly allocated to UIL by the government. However, the university allocates to the institute and hierarchically we receive our share as our plan with little modification. In fact, the lion's share of this budget goes to student internship program. Despite university-industry linkage is currently a top priority agenda for the government, there is some budgetary constraints (UILO, #2).*

The result of interview identified the hierarchical allocation of budget to UIL. The huge portion of this allocated budget goes to students' internship leaving research and innovation activities on the marginal side. However, the participant indirectly implied that the budget allocated to UIL is not adequate to address the issues of UIL. Thus, it is possible to infer that there is a shortage of finance to run the activities of UILO at the university level effectively. Moreover, some industries indicated that they did not totally allocate budget for this purpose too (IO, #3).

In relation to decision-making, the result of the interview also indicated that there is lack of joint decision-making between universities and industries. In support of this, UILO, #2 indicated that "---- there were some joint consultancy forums and meetings. However, the decision is made by the university. Invitation from the university is actually there." This implies that decisions on UIL are usually made by the universities. In some cases, industries were invited for consultation purposes. This will limit the commitment of industries, as they did not actually take part in the decision-making processes.

University-industry linkage is also related to maintaining intellectual property rights and technology transfer. In some sample universities, technology transfer is structured under separate office while in some it is organised under the office of UIL. For the purpose of this study, participants were requested on how intellectual property right and technology transfer was managed. In relation to this, the direct quotation of the interviewee (UIL, #5) is worth mentioning:

> *There is a huge gap in relation to this. However, we have strong ties with the ministry of science and technology so that it is actually managed by them. Therefore, we did not independently manage the issue.*

From the above quotation, one can easily understand that the issue of intellectual property right was not properly handled at the university level. It could be attributed to the highest decision-making body of the government–MoST. However, this needs close supervision and management as it solves many problems for industries. Through innovation, it can also be possible to contribute immensely to the economic development of the country. Equivocally, another interviewee also vowed that- "to my best knowledge, the issue of intellectual property right is loosely handled. Technology transfer to industries is also low, despite some activities underway with very few neighbouring industries. It can be said that it is insignificant" (UILO, #2).

This implies that the issue of intellectual property rights and technology transfer is at its early stage of development. Despite this, improving innovation capacities of graduates and marketing already established technologies would strengthen the

linkage between universities and industries. This will also increase the trust and commitment between the two parties, which will make industries more competent globally. Hence, it was pointed out that there was a problem in relation to technology transfer as the academic staff as well as students did not go deep into identifying the problems of the industry (UILO, #5; MoST, #2).

In general, the status of university-industry linkage in government universities of Ethiopia is at its infant stage. The establishment of interconnectedness between universities and industries was not fully established yet (MoST, #2). Despite several efforts made by the government in setting policies and guidelines, the implementation aspect was lacking. There was also lack of proper monitoring and evaluation mechanisms. As pointed out by respondent, “the activity of UIL is at its early stage of development---- limited to students’ internship and very few research projects” (UILO, #2). This idea was again supported by the interviewee (UILO, #3) who said that “the linkage is not this much. Sometimes, it is for meeting the requirements and with less understanding.” Other study participants also took the same position (MoST, #1, IO, #1 &IO, #2). Therefore, it is possible to conclude from this qualitative data that UIL is not properly managed. Its management was also weak with several interwoven challenges in it.

5.4.4. Areas of university-industry linkage

5.4.4.1. Students’ internship and staff externship

Universities and industries create partnerships in myriads of areas. Students’ internship for practical attachment is one major area with the aim of bridging theory and practice gaps. Students get various exposures to the practical world where they engage in different research, innovation and technology transfer activities. With this regard, respondents were interviewed and on the major areas of their partnership with the nearby industries. Interviewee (UILO, #5; MoST, #2) clearly indicated that the major area of linkage between universities and industries was mainly in student internship. Similarly, Interviewee (UILO, #2 & 3) also proved that the major area of university-industry linkage was dominated by students’ practical attachments to the industries through internships. From the field note and the interview made, it was also

observed that instructors were allowed to spend in industries to fill their practical gaps during their summer vacation for two months (IO, #1, IO, #3, UILO, #4).

In relation to this, the study confirms that industries can be viewed as laboratories and polishes the potential of the youngsters and prepares them for working market. Hence, university-industry collaborations give confidence andpractical hands-on experience to graduates and enable them to survive in the global market (Khan & Anwar, 2013: 273).

5.4.4.2. Research, consultancy and training

The other area of UIL was on research, consultancy and provision of training. Respondents confirmed that research, consultancy and training activities are in place. The study participant also witnessed that:

> *The second area of linkage is on research, training and consultancy services. We provide consultancies on maintaining export standards. We have also a link with Awash basin agro-processing and irrigation industries especially on irrigation (UILO, #2).*

It is possible to understand from the above quotation that research, training and consultancy services were the second major areas of UIL. Universities also provide different consultancy services to the industries found in their clusters. In support of the above response, Interviewee (UILO, #5) reported that “joint research project is highly encouraged by our university, but industries are reluctant in allocating budget for this purpose”. However, it was also indicated by the other interviewee that there were joint research projects with the industries, though; they were not satisfactory (UILO, #3). The existence of consultancy services was also confirmed by the experienced interviewee from the Ministry of Education with the projects like on Great Ethiopian Renaissance Dam, Adama Wind Farm, Railway construction and others by experienced universities of the country (MoE, #1; MoST, #2).

In addition to research and consultancy services, universities are involved in capacity-building areas with the industries through training. Despite its variation, it was

observed from the field notes that almost all sample universities considered for this study unanimously confirmed that they provide training for industry employees. Some universities also provide a scholarship for the industries found in their clusters. Emphatically, interviewee (UILO, #5) stated as follows:

> *Special to our university, we provide scholarship to men coming from industries. Hence, our contribution to human capacity development is also high. Short-term training and consultancy services are based on the identified gaps.*

As the means to strengthen the linkage between the two parties, universities offer scholarship opportunities for the industries. This strengthens the interaction between them and acquaints the industry employees with up-to-date science and technology discoveries of the modern era. Through this human capital development, they add value to the productivity of their industries. Besides this long-term training, short-term training was also given to industries based on their identified gaps (IO, #4). As a result, it can be well inferred from the discussions above that research, consultancy and capacity building through training were identified as the second major area of UIL in government universities of Ethiopia. However, the linkage was not this much strong constrained by several interwoven variables, which will further be discussed in the subsequent sections in detail.

5.4.4.3. Improving the teaching-learning process

One of the major benefits accrued from UIL is the improvement of the teaching-learning through various mechanisms. As the result of strong linkage, industries may provide financial resources for universities to solve facility and other related problems so that they can lay fertile ground for the improvement of the teaching-learning process. They can make their doors open for the university academicians and students to conduct problem-solving researches. They may also contribute to curriculum development for improving instruction in general. This could be through the revision of the already designed curriculum and designing new ones as per the demands of the market and the economy. However, the contribution of industries in the areas of improving the teaching and learning was pointed out as weak. Subsequently, there

was a huge gap in the skills required by the university graduates and what they practically exhibit in the field of work (IO, #2). In relation to this again, Interviewee (UILO, #5) argued that:

> *There is a huge gap in this regard. They are not willing to recruit our graduates. In this year, we planned to assess the reason behind whether it is related to skill, budget, and saturation or other. However, qualities of graduates are deteriorating nowadays.*

This implies that industries are reluctant to recruit graduates because of the poor quality graduates. This is actually attributed to what is actually going on in the universities. Hence, it calls for revising the inputs, processes and output variables indicated in chapter two. Despite this, it is possible to conclude that UIL could not contribute its level best to the improvement of the teaching-learning process. Consequently, the quality of graduates was deteriorating putting them in the disadvantaged position in joining the labour market (IO, #2; MoST, #2). In fact, this has a far-reaching implication on the economic development of the country, as it could not make use of its manpower, which could be taken as the basic input variable for the economic development of a nation other than other variables.

5.4.4.4. Resource share

Resource share is another area of UIL where both the universities and industries get the benefit. The actual practice of UIL in Ethiopia government universities shows that there is resource share with the nearby industries as students take practical training in the industries (MoST, #2). Specifically, graduate students spent about half of a semester for practical attachment with industries before their graduation. By citing example interviewee, UILO, #3, also pointed out that existence of resource share with the industries. For instance, the interviewee added, “---we share lab with the Ethiopian railway construction.” On the other hand, industries were even reluctant to use idle heavy and expensive machinery found in the universities. The other participant indicated that they even do not know what resources were found in the universities and vice versa (UILO, #5). Surprisingly, a participant from UILO head of one of the

sample universities shared the views of his academic staff who had exposure to visiting industries found in their vicinity as follows:

> *Training was also held with Wonji sugar factory for two days on Caison and BSC, and the same was true with Meteorology Agency in Addis Ababa. Our staff members got ample experiences from the visit to different industries. They wondered with what industries in the country were producing for export while there is a demand within the country. Even industries do not know what is produced in the country. They do not know each other. In this case, university-industry linkage can act as a catalyst in strengthening the linkages (UILO, #1).*

As explained by the participant, industries found in Ethiopia, even, do not know what others are producing. It was surprising that others were producing spare parts for the external market; whereas, the demand from within was not filled. Information on resource share among different industries and with the universities on resource sharing is missing. Therefore, resource share between universities and the industries are actually there, though, it was to the limited extent.

5.4.5. Benefits of UIL

5.4.5.1. Practical exposure

University-industry linkage (UIL) has several practical advantages to both parties (Hiwote, 2014: 67; Khan & Anwar, 2013: 269). Through students' practical attachments to industries, they will have exposure to the real work environment. In relation to this one study participant clearly indicated that:

> *There are numerous advantages. One major advantage obtained from UIL is students' internship and staff externship. We attached our students easily to the industries because we signed MoU. Our staff members were also sent to the industries for two weeks last summer (UILO, #1.)*

From the above quotation, it is possible to infer that universities obtained multifaceted advantages as the result of the linkages. Both the academic staff and students had exposure to the practical world. This will actually help them to relate the theory to the practice. Moreover, it will pave the way for assessing the labour market in which they will get employment opportunities. Strengthening the above quotations, interviewee, (UILO, #4) vowed that:

> *As the university, the major benefit is related to students' placement/internship. The exposure is a good starting. However, there is a need to evaluate the effectiveness of the internship program as the government is investing a huge amount of budget for its accomplishments. At a glance, I cannot say that it is bad.*

This implies that practical exposure of the prospective graduates to the real work environment was taken as the good commencement. Despite this, the effectiveness of this practical attachment needs serious follow-up as the government is investing a larger proportion of UIL budget for this purpose from its scarce resources. In fact, this was confirmed during the interview that more than 90 percent of the budget UIL goes to transport, *per diem* of students and university instructors during internships. Conversely, the importance of this practical attachment was found to be minimal in creating employment opportunities for prospective graduates (UILO, #3; IO, #1). Despite these challenges, the informants clearly pointed out that the major advantage accrued from UIL in Ethiopian government universities was mainly is practical exposure of both students and the academic staffs to the field of work.

5.4.5.2. Financial support

In areas where there is a strong link between universities and the industries, the latter provides financial support to the former for conducting innovative researches and technology transfer activities. Contrary to this, financial support given from industries to universities was minimal. In fact, this was the case as many of the industries in Ethiopia were not as profitable as pointed out by the experienced interviewee (UILO, #4). However, there were cases in which bureau of the industry of Dire Dawa city Administration covered the expenses of universities to provide training and

consultancy services to the emerging industries found in their catchment area by covering about 70 percent of their total cost (Interviewee, UILO, #2 and UILO, #3).Despite this effort by the government agencies, the informants indicated that financial support provided to universities from industries was minimal.

On the other hand, universities receive additional income as the result of their consultancy services provided to industries. In relation to this, interviewee (UILO, #5) witnessed that:

> *We increase our income as the result of the linkage. Ten percent of the income goes to university's income as the result of consultancy. Nowadays, the responsibility of the university is increasing as the result of this work. Industries are becoming profitable as the result of capacity-building training given to them by the universities (UILO, #5).*

From the quotation, it is possible to infer that some universities have increased their income as the result of their consultancy services that they provide to industries. Of course, the participant pointed out that 10 percent of the total consultancy services income goes to university's treasury. This was again shared by several study participants from the universities, industries and the government (MoE, #1; MoST, #1, IO, #1, UILO, #6). However, this was observed only in highly experienced and reputable universities in the country.

5.4.5.3. Capacity building

Capacity building is a mechanism to promote the knowledge, skill and attitude of employees in order to enhance their productivity or workers' effectiveness in the organisation through various training. It is argued that universities have knowledge; whereas, industries have the practical skills. Pooling these two abilities will enhance their relationship. In support of this, interviewee (UILO, #3) replied that:

> *In relation to training, the university has knowledge; whereas, the skill is there in the industry. They provide us with skills required through*

student internship and staff externship. We also offer them training to fill their knowledge gap.

From the field notes, it was observed that almost all the universities provide training for the nearby industries. However, they complain that it was not based on detail discussion of the two parties. Mostly universities arrange training without conducting adequate demand analysis. Confirming this, interviewee (UILO, #4) shed light on as follows:

Although we have trainingwith the manufacturing industries upon their request, there is no such strong linkage with them. The training provided to them is not well integrated. It is not based on the detailed discussion of the two parties, which makes it difficult to say joint. In this case, it can be said that it is very weak.

The training offered to industries was not based on consensus. It lacks coordination. In some cases, it was also argued that the right persons from the industries were not sent to industries for training. This makes the training objectives counterproductive. In other words, it has negative impacts on the UIL. Despite these challenges, which will be discussed in section 5.4.5 it can be said that Ethiopian government universities and industries benefitted from the linkage through various capacity-building programmes.

5.4.5.4. Research and consultancy services

Research and consultancy services are one of the major areas of benefit for university-industry linkage. Industries benefitted especially from the joint research outputs and the consultancy services they received from the universities. As a result, some universities have increased their income from the consultancy services. Interviewees also indicated that through some joint researches, industries increased their productivity too (UILO, #1). However, many of the activities of research and consultancy services are at their initial stage of development. In other words, most of the sample universities have identified their gaps with the industries found in their locality, memorandum of understanding was also signed, and activities are at the planning stage. It lacks actual implementation.

5.4.5.5. Entrepreneurial and skill development

Through internships, students will develop their entrepreneurial skills, which could help them to join the job market. In relation to this, students' practical attachment to industries may provide them with the opportunity to utilise cheap manpower provided to them. Interviewee (UILO, #4) corroborated this as:

> *The benefits to industries could be seen from obtaining cheap labour. Nevertheless, there is a problem of utilising this cheap labour on the parts of the industry. We observed during our visit that students are loosely handled. On the part of the university, we have to create conduhisive environment and while the industries need to consider the internees as their employees.*

As indicated in the quotation, obtaining young prospective graduates who can engage in industries was found to be a benefit for industries. It was also identified as a nice opportunity as they offer free labour and services to the industries. These young and motivated students may also come up with new ways of doing things by which they can increase productivity (IO, #4). On the part of the universities, students may also develop entrepreneurial skills through their practical exposure to the industries (UILO, #5). Researchers argue that industries are the living labs for the universities, where they can check the validity of their knowledge (Khan & Anwar, 2013: 271). Therefore, it can be said that UIL benefitted in the skill development of graduates in government universities of Ethiopia. However, this actual benefit was challenged by adequately utilising this opportunity by the industries as they could not manage the internees as their employees.

5.4.5.6. Resource share

Resource share is another area where universities could benefit from the industries and vice versa. Through resource share, both universities and the industries fill their own gaps. Especially, universities have educated manpower who can create new knowledge and technology. Moreover, they possess up to date knowledge that helps the industries to be competent. On the other hand, industries have skills and

resources, which could help the universities to conduct breakthrough researches and other related innovative activities. Therefore, by providing these, two advantages both the industries and the universities obtain mutual benefit (Khan & Anwar, 2013: 271). In this regard, the participant indicated the existence of resource share between his university and the nearby industries as, “We use their resources and they also use the knowledge from our university (manpower)” (UILO, #5, IO, #4).

As stated above, both universities and industries were mutually benefitted through resource share. The participants also pointed out the bi-directional flow of knowledge and skill between the two parties. On top of this, universities have increased their income as the result of the consultancies. However, some caveats hindered the full utilisation of the existing benefits that are presented in subsequent sections.

5.4.6. Challenges related to UIL

5.4.6.1. Policy-practice gaps

University-industry linkage operates under certain contextual policy frameworks. The Ethiopian government designed several policies related to UIL. However, interviewees indicated that these policies and guidelines were not able to come up with the expected results. Despite several efforts, the intended output in terms of the economic development of the country could not be achieved. In light of this, interviewee (UILO, #3) witnessed that: “The problem is related with the actual implementation. The issue of UIL is discussed in different forums, however, the actual practice is lacking.”

From the response of the interviews, it is possible to recognise that the actual problem avails in bridging the gaps between policies and practices. It was also well-acknowledged that government was arranging different forums and training to deepen the understanding of UIL. On the contrary, the problem lies in putting the policies and guidelines into practice. Similarly, another interview confirmed that:

> *On the parts of the university, the initiative of the university instructors is low in seeking of overload than engaging in research activities. At the university level, there is clear plan, guidelines and strategies of*

UIL. The major problem is related to implementation. There should be a clear strategy to enforce the industries (UILO, #2).

As indicated in the quotation, the university demands its instructors to engage in research and technology transfer activities actively. However, they are overburdened by teaching overloads. This is what actually contradicts with the expectation of universities mission and government roles alike. In addition to this, the interviewee confirmed the availability of plans, guidelines and strategies at least at his/her university level. The challenge remains that the actual implementation is lacking (IO, #1, MoE, #1, MoST, #1).

At the policy level, (TGE, 1994b: 25) indicated that the government demands the curriculum offered at the university level should be relevant, up-to-date and problem-solving. However, participants argued the relevance of the curriculum as it could not be able to address the demands of the labour market and the graduates. In support of this, interviewee (UILO, #5; IO, #2) emphatically pointed out that curriculum needs revision, especially, in science and technology fields. Training provided at the university level does not match with the demands of the industry. Moreover, students go to industries without adequate prerequisite knowledge to industries, and even they do not get sufficient time to train in the industries because of a shortage of budget (MoST, #2). Consequently, the issue of curriculum development challenged the actual implementation of policies in government universities of Ethiopia. Still more, the result of the Focus Group discussion coincides with the idea that the curriculum lacks relevance in relation to the demands of the market (FGD, #1). In sum, it is safe to understand from the results of the interview that, policy-practice gap was the major challenge that hindered the promotion of UIL.

5.4.6.2. Lack of trust and commitment

Developing trust and commitment between universities and industries will strengthen their partnership. In reality, it is the foundation for university-industry linkage. However, interview informants indicated that the major challenge for the linkage was the lack of trust and commitment especially on the parts of the industry (IO, #1; MoE, #1). Industries require the universities to solve their problems immediately and more of

practical than theory oriented. Despite this expectation, public universities in Ethiopia lack experiences. The long quotation below sheds light on the issue more:

> *Industries also seek an immediate solution from the university. However, this is difficult in our case as the linkage between U-I is at its early stage of development. Unfortunately, the previous education system of our country was not permissive to allow graduates to practice in the industries, though; there were limited number of industries in the country. As a result, the graduates were not with 'hands-on' practice to solve the problems of the universities. Therefore, it is not surprising that we lack graduates with appropriate skills that could solve the problems of the industries. If we start capacitating our students with relevant skills and knowledge today, we will have competent graduates who can solve the problems of the industry in the coming five or ten years (similar to other countries). Unless we start practising today, the problem will prevail for the next many years (UILO, #4).*

From this quotation, one can easily infer that there is an expectation gap between the universities and the industries. Industries seek universities are capable of solving their real problems. This remained a challenge in Ethiopian universities, as there was no such a strong tradition of providing practice-oriented training for the graduates. In contrast, the industries demand on spot solution to the problems they are facing. However, this is limited in the case of the universities as they lack adequate exposure to the practical world due to the previous education system, which could not be able to produce graduates with hands-on activities. In other words, the system was more of theory-oriented than actually practising the activities. Therefore, the lack of trust between the two parties is the results of this challenge. Consequently, industries were not adequately convinced to make their doors open for university researchers (UILO, #6; MoST, #1; MoE, #1). In some cases, even they demand support from universities to solve their own problems which were actually argued by the interviewee (UILO, #4) as:

> *We need industries to make their doors open for the researchers and suggest solutions to their problems using their own financial bases. For instance, university should not take the initiative for the industry to design and build waste treatment plant while the industry is there. We may participate when the industries provide us with the required budget.*

This implies that industries require universities to solve their problems free of charge. On the contrary, lack of trust and commitment on the problem-solving capacity of researchers become a doubt for industries. To strengthen the linkage, industries also demand financial support from universities in return for their hostage of internship students. Moreover, they want to see problems of their organisation are practically solved. In this regard, interviewee, UILO,#1 stated that " industries take a safe position by saying, if universities have solved our problems and we are convinced with what they are doing, then, we will pay them at the end". Therefore, it is possible to understand that the problem of university-industry linkage was challenged by lack of trust and commitment between the two. Emphatically, this is again supported by one of the senior professionals in the field as follows:

> *The major challenge is lack of trust (with emphasis). University instructors see immediate benefits like monetary incentives. We do not see future benefits. We do not have the trust that we will be paid tomorrow. On the other hand, our industries need to work with foreign professionals at the expense of the domestic ones. They should start to train ours today for better tomorrow (UILO #4).*

Equivocally, another study participant indicated that "universities do not provide necessary knowledge inputs to the industries and industries do not also provide adequate support to universities. Trust is not built between the two" (MoST, #2). The interviewees underscored the importance of the future development of the country than the immediate benefits. Creating a close relationship between the universities and investing on "today for better tomorrow" was indicated as a means to develop trust. In general, UIL in government universities of Ethiopia was constrained by lack of trust and commitment of the two parties in strengthening the partnership.

5.4.6.3. Financial related challenges

Proper management of UIL requires assurance of adequate funds. The study also indicates that university-industry partnership could stimulate the mechanisms for integrating finance to promote research and development activities within the education and the industrial system (Adeoti, 2009: 383). UIL needs financial resources for conducting scientific researches, innovation, establishing various technology incubation centres, laboratories and other related activities. The strength of UIL partly depends on the extent to which these facilities are fulfilled if given free hand from the government, university management and the industries. Nonetheless, adequate finance was not allocated to promote UIL. The data obtained from interviewee corroborate this:

> *Though we have links with the industries, there are also problems. You know, through links, we want to solve the problems of the industries. However, they are not willing to pay for that. Researchers need budget from the industries whereas the industries need this budget to be allocated from the university. They are not willing to pay budget for their own problems to be solved (UILO, #1).*

As pointed out by the participant, industries were not willing to allocate financial resources to solve their own problems. Surprisingly enough, they demand universities to allocate budget for industries so that they can solve their own problems. This will actually loosen the partnership between the two. In confirming this, another interviewee added that:

> *To me, the problems related with the industries outweigh that of the universities. Industries need universities to allocate budget for them and solve their own problems through research. Contrary to this, money allocated to universities is for designed purposes, specifically, to do scientific researches. Thus, we do not have extra budget to buy machines for the industries. Even though, there is extra budget I do not personally feel that it is convincing. In this regard, we cannot go*

> *beyond prototyping and testing, as there is no capacity to do so on the part of the university (UILO, #4).*

Therefore, industries need universities to solve their problems with their own expenses, whereas, this is not convincing to the participant. Money allocated by the government to universities was for the aim of conducting scientific research than solving problems specific to industries. Participants indicated that to the maximum, universities do not go beyond prototyping their own research outputs for marketing. Concomitantly, Interviewee (UILO, #5) pointed out that industries do not allocate budget for research and technology transfer activities. This was again confirmed by the industries themselves that as they do not have money allocated for this purpose directly (IO, #3 & IO, #4).

The assumption behind this problem was that both students and university instructors were training on the industrial machines and services. However, universities do not pay for these services so that they demand free research, consultancy and technology transfer activities as a return. Strengthening this, another interviewee stated that:

> *They assume that university instructors and students train on their facilities, which should be taken as an opportunity. Industries consider this exposure as an opportunity for university so that they are not willing to pay additional expenses for this. On the other side, the university is not willing to afford such expenses. (UILO, #1)*

Taking into account the advantage of training student internees and staff externship, industries need the universities to conduct *inter alia* research, provide consultancy services and training free of charge. Nonetheless, this was contested on the parts of the universities for the above-mentioned reasons. This actually calls for looking middle ground by the government where the cost issue could be considered through a tax deduction and other intervention strategies based on the number of students they host (UILO, #4; MoST, #2).

On the other hand, universities allocate budget for UIL both for administrative and student internship purposes. Interviewees confirmed that there was no such huge

problem in relation to assigninga budget for students' internship (UILO, #3). As a result, some universities use some of their financial resources for renting vehicles from the private owners as there was a mismatch between the actually available transport services within the university and the number of students who are going to the industries every year (UILO, #1). From the open-ended questions, it was also inferred that the limitation of facilities for UIL was attributed to the shortage of finance. Moreover, the result of Focus group discussion showed the existence of serious shortages of vehicles to transport students to the industries during their internship (FGI, #2). Therefore, from discussion made so far, it is possible to understand that finance-related challenges are one of the major causes for inadequate performance of UIL in government universities of Ethiopia.

5.4.6.4. Reluctance of the local industries

The other challenge for UIL was found to be the reluctance of the local industries in promoting partnerships. Industries assume that the relationship with the universities is an extra burden to them. They also complained that they do not have any benefit for the services that they provide for the university students and the academic staffs. The reluctance of industries could also emanate from lack of enforcement on the part of the government to strengthen UIL. In confirming this, interviewee (UILO, #1) exemplifies:

> *However, because of our MoU, they accept our students. If they (industries) are not willing, there is no enforcing mechanism to accept our students. Sorry to say, there are some industries that are totally ignorant of accepting our students. The interference of the government is not strong in this regard. However, through negotiation, we use win-win approach to create a link with them.*

Another interviewee added:

> *Some of the industries are very much reluctant to take students. They are not totally willing to take students from the university, especially private industries (UILO, #2).*

As explained above, universities try to place their students in the industries as the result of their agreement. The interviewee also indicated that there were some industries, which did not totally accept students from the universities. This was attributed to low intervention by the government at different levels to strengthen linkage. Consequently, students lack necessary skills required for the labour market. Similarly, another interviewee explained the reluctance of industries as follows:

> *Unwillingness of the industries to accept student internees was a major challenge. They assume students as a burden to them. They also complain that the expenses requested by universities for consultancy service are expensive. They question where the issue of linkage is. There should be some sort of consideration by the university for the benefit of the linkage. I think this makes them reluctant (UILO, #2).*

The participant indicated that the benefit for the industries was minimal. Industries demand at least to consider the linkage as an advantage to reduce the costs of consultancy services. As a result, they close their gates to university students (UILO, #5). Other interviewees also attribute this to the lack of awareness on the part of the industries. This, in turn, emanates from the lack of proper communication between universities and industries (UILO, #3). On the part of the industry again, study participants confirmed the existence of some private industries, which are not willing to host internship students from the university (IO, #1). The argument provided by another experienced expert from the Ministry of Education also pointed out that, although the number of industries in the country is limited, they are providing internship services below their hosting capacity (MoE, #1). FGI participants also agreed on the existence of unwillingness of the local industries to host university internees and some of them cited their experience as they joined industries for their practical work through lobbying (FGI, #1).

In this regard, there is little motivation mechanism by the government for the industries to take part in UIL. Emphatically, interviewee (UILO, #1) indicated that industries are always reluctant to work with us because they have no priviledge from the government or the universities, for instance, they are accepting our students for free, although their

number is less.Actually, this is based on their willingness. The government has designed the guidelines, but no push (UILO, #1; UILO, #6; IO, #1). In this regard, linkage is based on the whims and good will of individuals than based on designed procedures and guidelines (IO, #1; MoST, #2). Therefore, the reluctance of the local industries was reported as one major challenge for strengthening UIL in government universities of Ethiopia.

5.4.6.5. Institutional challenges

Literature indicates that university-industry linkages in many developing countries have been challenged by historically rooted cultural and institutional barriers, which take time to overcome (Guimon, 2013: 3). However, university-industry linkage needs a well-organised institution in terms of using human, material, financial and other related resources. Currently, to strengthen the UIL several institutes and clusters were established in Ethiopia. However, there are various institutional challenges from both the universities and the industries. In this regard, universities have their own problems of communicating with the industries. In support of this interviewee (UILO, #4) has something to say:

> *On the part of the university, there is a problem to knock at the doors of the industries repeatedly. There is limited concern to solve the problems of the industries. Growing number of students from the Engineering and Technology College by itself has created additional load to the university. Moreover, the academicians need immediate incentives for what they are doing with the industries. However, there is a push from the university that, we have to provide services and show our potential by practically solving the problems of the industries.*

As indicated by the interviewee, there is the challenge on the part of the universities to make interaction with the industries on a continuous basis. Some universities do not also take solving the problems of the industries as their top priority agenda through research. Some interviewees attached this challenge to lack of competent leadership in relation to UIL both at the university and the industry level (MoST, #2; IO, #3; UILO,

#6). This is actually fuelled by the growing number of students who are assigned to universities. This has created pressure on both the universities and the industries (IO, #3). Still more, proper utilisation of manpower by the two parties was found to be another challenge to enhance UIL. In support of this, interviewee, (UILO, #1) indicated the multi-faceted institutional challenge of UIL as follows:

> *Theoretically, there is an exchange of manpower. Nevertheless, in practical cases, there is no exchange of professors except for occasional monitoring and evaluation of internees in the industry. This may be attributed to work overload at the university, shortage of transport, lack of practical skill on the part of the instructors, unwillingness of the industries, cultural differences with the industries, geographical distribution of the industries and lack of information on market gaps.*

From the above interview, UIL was challenged by lack of continuous follow up by the university instructors, shortage of facilities like transport and inadequate capacity in solving the problems of the industries. This resulted in passive interaction between the two parties. In addition to this, geographical distribution of industries has created challenges to promote UIL. In other words, most of the industries are located around the capital city Finfine/Addis Ababa leaving emerging universities at adisadvantage position. This problem was worsened by lack of adequate information on market gaps where manpower demand is lacking. Universities were blamed for producing graduates who ill-fit to the demands of the industry in particular and the economy in general (Khan & Anwar, 2013: 270; Guimon, 2013: 3). In some cases, after employment industries re-train university graduates to fit them into their work environment. The participant also elaborated that cultural difference between university academicians and the industry work environment was another institutional rift for promoting UIL.

Another institutional challenge that hindered the proper functioning of UIL is lack of clear job description of the UIL offices. Participants agreed that there are well-designed policies and guidelines at the national level (MoE, #1; MoST, #1; IO, #1; UILO, #5). However, the issue of UIL is narrowly defined in some universities limiting

to simple coordination of students' internship (MoST, #2). Another Interviewee corroborated this idea as:

> *Clear activities of UIL office are not well described. At the country level, there are policies and guidelines. There is no clear demarcation of activities. It is nothing more than the coordination of students' internship (UILO, #3).*

Universities do not have properly designed evaluation mechanisms after they send students to the industries. Emergency management strategies are not in place. The detail of the issue was elucidated by the interviewee (UILO, #4) as follows:

> *There are no clear guidelines when there are emergencies while the internees are in practice. Standard evaluation format is lacking at the national level, and it varies across the department within the university itself. Industries do not properly monitor practising students. At the end, they send back them to us with exaggerated evaluation results.*

As a result, there are variations in the evaluation system across the universities as well as within the universities. This makes the evaluation system subjective and simply for meeting the requirements than considering its real advantage. The participant also indicated that internees were sent back to universities with inflated grades, which will negatively affect the quality of education.

On the part of the university, a major challenge was found to be lack of proper monitoring and evaluation system. Furthermore, internees are sent to industries without adequate orientation, and they face challenges due to variation with what they have learnt in the universities and what they actually practice in the industry (IO, #1; MoST, #2). From the field notes and interview results, it was observed that university instructors did not properly follow up their students in the industry because of several challenges indicated so far, for example, transport. Interviewee (UILO, #3) upholds this idea by saying:

> *Lack of monitoring and evaluation of internship students is worth mentioning. The evaluation is more for report consumption than for its actual advantages… There are cases in which university instructors did not properly follow up the internees in the industries. Actually, there is some sort of carelessness there.*

The other challenge on the part of the government was identified as the lack of coordination among the three ministries (MoE, MoST, and MoI) who are directly concerned with the issue. Interviewee (UILO, #5) attested the issue as follows:

> *Lack of coordination among MoST, MoE and MoI was the major challenge. Fragmented policies are there among the three ministries. Joint policy, implementation and consultation programme is lacking. MoST, MoE and MoI call different meetings at different times for the same purpose. This shows that there is lack of coordination among the three government bodies.*

This is, basically, a major institutional challenge as it creates confusion between industries and universities. In other words, monitoring and evaluation of activities of UIL will be difficult as they are accountable to three government ministries, which violate the principle of unity of command in management.

Finally, the capacity of the local industries to accommodate student internees from the universities was another pressing challenge that the UIL is currently confronting. As the strategy of the government to expand science and technology fields, the number of students joining these fields is increasing from time to time at least for the past seven years. This has put strong pressure on the industries as the number of students demanding internship does not match with the capacity of the local industries (UILO, #4, IO, #1; IO, #3). Consequently, it is not this much surprising if industries refuse to accept internees from the universities or carelessly evaluate these students as their number is by far beyond their hosting capacity.

In general, UIL in government universities of Ethiopia was challenged by several institutional issues. The growing number of students from year to year challenged the

capacity of the industries as well as the universities. This made monitoring and evaluation system unmanageable. Actually, this was again exacerbated by poor facilities of the universities, lack of motivation for the industries and inadequate coordination among the three government ministries.

5.4.7. Opportunities for promoting UIL

5.4.7.1. Exposure to practical world

Opportunities to university-industry linkage can be seen from the government, universities and the industries perspectives (Refer the Triple Helix model, section 2.3). Interviewees were requested to forward their views in relation to the existing opportunities/efforts made by the three role players. Accordingly, the major opportunities for the university could be seen from the perspectives of the improvement of the quality of the teaching process. Students get practical exposure to the industries to some extent. As a result, they will be able to relate theory with practice. Interviewee (UILO, #4) illuminates the issue as follows:

> *They also support the university by producing quality graduates. As the result of their inputs, social exposure, our graduates will have the required skill, attitudinal changes and professional ethics. Therefore, industries are our living labs. They could be the media for our instruction.*

As explained by the interviewee, industries could contribute their level best for producing quality graduates. Through their exposure to the work environment (UILO, #2; 3; & 5), they will develop their skills, attitudes and professional ethics required for tomorrow's employees (MoE, #1; IO, #3). Consequently, industries serve universities as their living labs where students and academic staffs actually practice and practically obtain exposure to the work environment. This has a multidimensional advantage for the future development of the practitioners. In this regard, there are some committed industries, who won the appreciation of the universities. The testimony of the participant (UILO, #2) were stated as follows:

> *There are some industries that provide adequate training for our students. They also write testimonies for our students. There are industries that help our students in identifying projects, design proposals and evaluate the results of the students properly.*

These committed industries benefit both the internees as well as themselves. Through the projects, students and instructors may come up with innovative ideas that could solve the problems of the industries (IO, #4). On the other hand, the quality of graduates will increase which will intern promotes the institutional reputability of the universities. Industries also obtain cheap manpower that can provide them with almost free services to boost their productivity/services. Interviewee (UILO, #4) substantiates this argument as:

> *For industries, obtaining cheap labour is a good opportunity with all its drawbacks/limitations, especially in relation to quality issues. It should initiate and motivate industries. Through externship, they open themselves to researchers, which might be taken as opportunity (UILO, #4).*

Besides, to obtaining cheap labour, industries expose themselves to university instructors and students to conduct problem-solving researches, which may help the industries in particular and the country in general. In other words, it will promote the linkage between the two parties, which could also be taken as an opportunity. The importance of the university depends on the exposure to industries and practically solving their problems (UILO, #4).

5.4.7.2. Government attention

The Ethiopian government took the prime initiative in promoting UIL through designing various policies, plans and guidelines. Almost all interviewees witnessed the undivided attention of the government to strengthen the interaction between the two parties. Interviewee (UILO, #3) advocates this as:

> *On the government side, the emphasis given to UIL in terms of launching different plans, policies and guidelines is very much promising. Different clusters were formed like textile, metal, chemical and construction inputs. Different forums were also organised. If we make use of them, it is a nice opportunity.*

This was similarly viewed by the interviewee (UILO, #1; MoE, #1; MoST, #1; IO, #3). This implies that the Ethiopian government gave due attention to promote UIL through designing of policies and strategies. The education system of the country required to produce industry driven manpower that fills the market gap. Therefore, the demand of the government to feed one another and to full fill its development agenda is an opportunity (UILO, #4; IO, #1; MoE, #1; MoST, #1; FGD, #2).

Government as facilitator and leader (Refer Chapter Two, section 2.4.1), through proper linkage economic transformation of the country, will be realised. The number of universities and industries are expanding in the country. Consequently, promoting UIL is a major policy tool to bring about economic development (UILO, #4). Refer also the conceptual framework developed in chapter two (Section, 2.10). This ultimate goal of the government is achieved when the required manpower is produced through linkage of universities and industries. As a result, productivity will increase, and UIL becomes the major policy implementation tool for the government. Hence, UIL is an opportunity for the government onthe one hand, as a means to meet its development agenda and to smooth interaction and partnership between universities and industries on the other.

5.4.7.3. Blooming industries

Currently, the industry sector in Ethiopia is one of the fastest growing sectors in Ethiopia at 19.2 percent per annum (FDRE, 2016: 28). To feed this growing sector with the required manpower, the Ethiopian government also took measures to expand universities. Interview participants also confirmed this as a good opportunity for strengthening UIL than ever. In relation to this, interviewee (UILO, #1) has something to say:

> *There are better opportunities in terms of UIL and Technology transfer. The growing number of both industries and the universities may be taken as an opportunity. In fact, there are forgotten industries that the universities need to create relationships with. Different institutions are there for these purposes.*

In a similar vein, another interviewee also confirmed the expansion of industries as a good opportunity for UIL. By citing his university as an example, he explained:

> *From the part of the industry, we are located in one of the best industrial zones of the country (main import and export gate of the country). By virtue of this geographical location, many industries are located here. The blossoming of industries and the geographical location of the university in general, could be taken as an opportunity to strengthen UIL in our case (UILO, #3).*

The expansion of industries in the country has contributed to the strengthening of UIL despite, its inherent limitations discussed in the previous sections. The establishment of these industries in different parts of the country was taken as the opportunity in this regard.

Interviewees also cite the growing number of industries has brought a positive outlook to contribute their level best for manpower development that the country demands (UILO, #2 and UILO, #5). Interviewees argued that previously the image of the industries to universities was very low (IO, #3; MoST, #2; FGD, #1). The reverse was also true. The industries do not trust that universities could solve their problems. However, as the result of continuous deliberations on the issues with the industries, the problem is now relatively improved, and they requested to work with universities. Of course, this could be taken as the opportunity to UIL (UILO, #5). In sum, from the interview results and discussions made so far, the expansion of industries coupled with increased awareness on the issues of UIL to some extent was taken as an opportunity. Still more, the attempt of the government to establish different industrial parks in different corridors of the country (IO, #4; MoST, #2) could be taken as the opportunity to enhance UIL in government universities of Ethiopia further.

5.4.8. Strategies to promote UIL

5.4.8.1. Motivation and legal enforcement

University-industry linkage needs well-thought strategies to solve the challenges discussed so far. In line with this, respondents were requested to forward their comments to avert the problems (ULO, #1; IO, #1). Accordingly, motivation and legal enforcement were identified as the strategy to reduce challenges of promoting UIL. In support of this, interviewee stressed the importance of motivating industries in creatingpartnershipsasthe government should take the initiative to capacitate the universities or subsidies the industries, probably, through tax deduction (UILO, #4; MoST, #2, FGD, #1).

Therefore, motivating industries through different subsidies, probably, tax deduction could be one, was identified as the strategy to motivate industries. On the other hand, the capacity of the universities should be strengthened to solve the problems of the industries. In relation to this again, participants argued that, there should be a legal entity that could properly oversee the issue of UIL at the national level (UILO, #1; UILO, #2; FGD, #2). In other words, the activities of UIL were given to MoE as it is in-charge of expanding and controlling universities (FDRE, 2015: 8636) and strengthening UIL was also given to both MoI and MoST as stipulated in Article 21(6) and Article 23 (6)of the same proclamation (FDRE,2015: 8609 and FDRE, 2015: 8615). Therefore, the worry indicated by the interviewee seems relevant as this may create challenges.

In addition to motivation, study participants witnessed the need for legal enforcement to strengthen UIL. They frequently argued that, there were many totally ignorant industries that chase out students from the gate (UILO, #1; FGD, #1). Consequently, as the government took prime initiatives to expand universities, it has also laid the platform for students to practice in the industries. Therefore, there should be enforcing mechanisms in this regard (UILO, #5).

However, from the documents of MoST, it is possible to observe that industries have an obligation to accept student internees from the universities, though the guideline

lacks what measures should be taken in case of refusal by the industries(MoST, 2013: 19).

5.4.8.2. Practical engagement in problem-solving

Universities are expected to alleviate the problems of the industries. This will increase the trust and boost the partnership between the two parties. To do this, many interviewees and focus group discussion participants strongly commented that universities should take the prime initiative to win the match. In this regard, the view of the interviewee (UILO #1), reads:

> *The university should be very much open and willing to work with the industries. There are some hindrances. It should take the initiative and should move, repeatedly knock at the industries to create a link. Universities should be a model with high initiative. We should go to the industries tirelessly more without upsetting until we win.*

Universities should strongly work to make industries aware of their mutual benefits. In some cases, industries do not know the capacity of the universities. From the field notes taken and interview results, industries were filled with doubt that universities could solve their problems. In line with this, interviewee (UILO, #5) advised that it is also important to share the profile of university academic staff so that they may be attracted to create a link with the universities. Strengthening this, a participant from the industry in the study indicated the need to have professional organisations from universities to address the problems of the industries, which will reduce the cost that local industries spend for professionals from abroad (IO, #3).

In addition to this, interviewees recommend that universities should engage themselves in practically solving the problems of the industries. Consultancy services provided to industries should also take into account the benefits obtained as result of interaction between the two parties at the time of financial requisitions. In line with this again, Interviewee (UILO, #2) stated:

> *Universities should take the initiative to work on researches that practically solves the problems of the industries. We have to also consider financial issues that we request industries for consultancy services as they also participate incapacitating our students through internship for free. Some financial consideration has to be there to strengthen the linkage. Even in cases where there are shortages universities should take part in sharing some of the miscellaneous expenses, at least until, the linkage is well recognised by the industries.*

As explained above, to solve the problems of the industries practically it is vital to consider the financial issues that hold industries back. It seems relevant to revise the financial requisition for consultancy services by taking into account the service they provide for strengthening partnerships.

The other point that warrants special attention is to improve the practical engagement of universities in industry affairs like in solving problems related to labs. In some instances, interviewees argued that the laboratories used in universities are different from the one that was found in the industries. Some of them were ill-equipped while others were outdated in relation to the growing demand for current technologies. The gap was explained by one of the participants as follows:

> *We usually train our students on our labs; whereas, industries use their labs at the time of employment. This brings difficulty to graduating students to join the labour market. Therefore, training students in those labs is important in different fields. I think this will increase employment opportunities for our graduates (UILO, #5).*

The interviewee further explained that industries and universities should be established in close vicinity to enable them to share resources. This brings mutual benefits to both the universities and the industries. Otherwise, universities should establish similar workshops to industries as much as possible to increase the problem-solving capacity of the industries (UILO, #5). This will increase their practical engagement with the industries.

5.4.8.3. Advertising and sensitising UIL programmes

In developing countries, universities and industries have less interaction to create partnerships. Universities were overwhelmed by their traditional roles of teaching and learning at the expense of research and community service activities (Adeoti, 2009: 378). On the other hand, industries do not really recognise the importance of universities in solving their problems through research and bringing new innovations. This requires continuous deliberations and sensitisation on various UIL activities. In line with this, interview participants commented that awareness creation and sensitisation programmes should be further strengthened to increase university-industry partnership. In this regard (UILO, #2) suggested:

> *Industries should not be 'black box'. They should make their door open for the universities. In areas where the industries turn our students and researchers from the gate, it is impossible to solve problems of the industries. There should be a common forum that links universities with industries, which could be mediated by the government. The government should serve as the glue that binds the two parties together. A month ago, there was conference hosted by the ministry of science and technology where the number of participants on the side of the industries was limited.*

As indicated above, there should not be any kind of secret between universities and the industries as far as the issue of research and innovation is concerned. The government can play a major role in mediating the two parties in strengthening the partnership. However, it was also indicated that industries were not willing to attend joint forums of UIL by citing his own experience. Other study participants also shared the above view by saying, to increase the willingness of industries, it is important to knock on the doors of industries and for these, arranging different forums on continuous basis seems relevant (UILO, #5; IO, #1; MoE, #1; FGD, #2). These forums could be arranged at national, regional and university levels in which actively participating industries will be awarded, acknowledged and certified. Other interviewee witnessed improvements made so as follows:

Because of the existence of government platform, the issue of UIL has got acceptance beyond the Engineering and technology sector. Now the issue has got wide popularity at all government structures including public Medias. This needs to be strengthened (UILO, #4).

Therefore, the improvements observed in this case should be given wider coverage to increase UIL than ever. Thinking for better tomorrow (UILO, #3) and developing a culture of tolerance and strengthening uninterrupted communication (UILO, #4) were generally commented as the strategy to promote UIL. Creating competitive environment among industries and universities were also pointed out as a strategy to promote UIL by study participants (IO, #2). To this end, it is possible to say that publicising and sensitising UIL programmes through different public Medias, publications and information dissemination mechanisms were commented upon by research participants. Still more these demand awarding, acknowledging and certifying better performing industries to enhance UIL.

5.4.8.4. Clear structure

Above all, a clear organisational structure that runs down the organisational hierarchy with clearly defined roles and responsibilities will partly determine the success of UIL. The structure should vividly show the channel of communication with the government, laterally among universities and with industries. Similarly, it should also depict its structure within the university and the industry itself. On the government side, interviewees commented on the need for establishing a separate office in charge of UIL as follows:

I think, from the point of the government, several efforts were made to create a good link between the university and the industry. However, the absence of office, which will only focus on the UIL at the government level, is the major problem. Therefore, it is important to establish separate ministry/agency/commission known by its name, which is directly focusing on UIL. We do not know where to appeal in case of problems as we are sometimes under MoST, MoE, or MoI. So, this is not visible, and I want to see this in a clear structure (UILO, #1).

It is worrisome for the participants that universities do not have a clearly defined structure to whom they appeal in case of problems in relation to UIL. As discussed so far, there are challenges related to the availability of structure, which made the interaction between the two parties difficult. Strengthening the above comments, interviewee (UILO, #2) stated as follows:

> *There is no structure that links MoE, MoST and MoTI so that there is no clearly responsible body that directs all the three parties. Legal entity that regularly monitors and evaluates the implementation of UIL is very important. Hope, this will minimise problems stated so far. Industries should not give us their back anymore.*

From the interview, it is possible to understand that the three government ministries (MoE, MoST and MoI) lack proper coordination. However, MoST established two-tier structures one at the national level which was organised by the national council for science, technology and innovation, while the other to be formed at the zone level based on the growth corridors (MoST, 2013: 12). Despite this, study participants argue for the need to establish independent agency or commission that can strongly work on enhancing UIL (FGD, #2). This strategy was supported by many interviewees participated in the study in alleviating the problems observed so far to some extent.

In addition to this, some informants argued that UIL did not get adequate attention in the university structure. Study participants contend that some top-level university managers still consider UIL as simple coordination of students' internship. In relation to this, interviewee (UILO, #3) stated that:

> *I think the major problem lies here. In most cases, top-level managers consider university-industry linkage office simply as the coordinator of students' internship. Hosting the requests, arranging the program, and controlling the process in general are overlooked… There should be a clear structure with roles and responsibilities described at the university level. Balanced authority with accountability is required.*

Therefore, developing clear structure both at the university and at national level was suggested as the strategy to promote UIL at the government universities of Ethiopia.

5.4.8.5. Strengthening monitoring and evaluation system

Monitoring and evaluation system is the means to obtain feedback whether nationally designed policies and directives are put into practice or not. Continuous and standardised monitoring and evaluation system helps to detect the challenges faced at its inception so that it paves the room for devising strategies to solve problems. In line with this, interviewees indicated the importance of M & E system at the national level as follows:

> *At the government level, it is important to strengthen the monitoring and evaluation system. The level of emphasis given to UIL should be properly monitored. We do not have direct communication with the right person from the industries as the structure is under the research and technology transfer office (UILO, #3).*

Another interviewee also emphasised the need for properly organised monitoring and evaluation system that it needs to be a national agenda. This could be conducted by the joint effort of the government, universities and industries. The interviewee put:

> *Beyond sending students to industries, university professors should constantly monitor and evaluate what students are doing in the industry during their internship. We have to improve our evaluation system. We need to go beyond the report and grade that they bring from the industries (UILO, #5).*

Beyond the government at the national level, universities should properly monitor and evaluate the activities of UIL. They should take the prime initiative in monitoring and evaluating the activities of their students while they are in the industries. The response of the interviewee (UILO, #1) reads:

The university is not making proper follow up of its own students. This might be because instructors' work overload and transportation-related problems. Things are carelessly thrown to supervisors and industries. This needs special attention.

The interviewee warned that proper follow up of students was lacking at the university level. Consequently, universities are advised to solve their own problems related to UIL. On the other hand, the results of field note and interview also asserted that industries should develop a sense of ownership and belongingness as they are twinned with the industries (UILO, #1; UILO, #4; IO, #1; IO, #3; MoST, #1). These strategies were identified by the study participants as a remedy to solve/minimise the challenges of UIL in government universities of Ethiopia.

5.5. INTERPRETATION OF QUALITATIVE DATA

As discussed in section 2.3.3 of the Triple Helix typology, managing university-industry linkage requires symbiotic/balanced/interactive relationship amongthe partners-Government, universities and industries (Etzkowitz, 2002: 4; Ranga & Etzkowitz, 2013: 239; Guimon, 2013: 3; Ahmed & Jumani, 2013: 208; D'Este & Patel, 2007: 1296). This relation is assumed to commence with planning. However, the data show that both universities and industries plan their activities independently of each other. Consequently, UIL lacks joint planning. This has made the relationship weak. In addition to this, UIL in government universities of Ethiopia was not adequately staffed and organised both in human, material and financial resources. Joint recruitment of personnel and share of resources were lacking. Moreover, joint decision making was minimal between universities and industries on issues of UIL. Hence, university-industry linkage was not properly managed. This is true in countries like Ethiopia, where the culture of inventing and utilising indigenous technology development is low, and a greater majority of industries were traditional based (Derbew, Mungamura, Asnake, 2015: 74). This is the case as the African universities are suffering from poor leadership and management practices as discussed in section 3.7.2 of this study.

Confirming with the quantitative results, the qualitative data also identified students' internship and staff externship programmes, research projects, consultancy and

capacity building and improving the teaching-learning process were the major areas of UIL in government universities of Ethiopia. Both students and the academic staff members improved their skill gaps by relating the theoretical knowledge they obtained in the university with the actual performance of the industries. Moreover, they have linkage in resources share, though; industries do not have a guarantee from universities in case machine break and emergencies (Abdu, 2013: 154).

So far, UIL contributed to the practical exposure of university graduates to the world of work through their internship programmes. Universities received financial support from the industries for some limited research projects and consultancy services. Industries on their part obtained capacity-building training from the nearby universities. Graduating students have benefitted in the area of entrepreneurship and skill development. On the other hand, industries exposed themselves to new knowledge and new ways of doing things, cheap manpower that could be easily tapped from the expanding universities found in the country.

In the context of the Ethiopian government universities, UIL has several challenges. The result of qualitative data pointed out that policy-practice gaps, lack of trust and commitment of both universities and the industries, the reluctance of local industries and institutional challenges were the major categories. Policies designed at the national level were not adequately changed to practice at the grass-root level. In line with this Abdu, (2013: 133) argued that at a lower level of ministries' structure, UIP related policies have only remained on the study (also refer section 3.7.1 of this study). Moreover, industries do not trust the problem solving and innovative capacities of the domestic professors. This was attributed to the lack of practical skills provided in the previous education systems. This was again worsened by the limited capacity of the country to furnish UIL related infrastructure sufficiently that paves the way for better innovation and technology transfer. On the contrary, research underscored the importance of building shared trust and vision to strengthen UIL (Abraham, 2016: 11; Ahmed & Jumani, 2013: 203; Hiwote, 2014; 67).

As the major challenge, local industries were not willing to work with the universities as the trust between the two parties was not fully developed. Industries argue the lack of motivation mechanisms from both the universities and the government. In such

cases, it seems difficult to expect some pleasing results from the partnership (Hiwote, 2014: 66; .Ahmed & Jumani, 2013: 205). On the other hand, universities have several institutional challenges in practically solving the problems of the industries. They do not have adequate infrastructure and facilities that promote innovation and technology transfer, consequently, focusing on the teaching mission than the other. This coincides with what African universities are facing as discussed in section 3.7.5.

Optimistically, UIL in government universities of Ethiopia have some green lights. Primarily, the government gave attention to UIL than ever by designing different policies and guidelines and by incorporating the issues of UIL indifferent policy directives (TGE, 1994a: 359; TGE, 1994b: 25; FDRE, 2003: 2237; FDRE, 2009: 4991; FDRE, 2015: 8614; MoST, 2013: 10). On the part of the university, different technology institutes were expanding in different universities, which could help them to create a link with the industries. They had helped the students to improve their skills to some extent; hence, industries are serving as the living labs to universities where students relate theory with the practice. Consequently, the quality of graduates will improve progressively, reputability of the universities will increase, and strong partnership between the universities and the industries will be created on a sustained basis. This is supported by the blooming industries found in different development corridors of the country, which was considered as the opportunity (MoST, 2013: 12).

5.6. CONCLUSION OF THE QUALITATIVE DATA

Interview and Focus Group Interviews were used as methods of data gathering tools for the qualitative part. The result showed that the level of management of university-industry linkage was at its early stage of development and lacked proper co-ordination, implementation, and continuous monitoring and evaluation systems.

Planning as the primary function of management was not properly implemented as far as the management of UIL was concerned. Universities and industries plan for their own activities independently of one another. Consultation on planning was held mainly with the initiation of the universities. Hence, it is difficult to say that the planning function was carried out jointly. On top of this, joint implementation of plans and monitoring and evaluation of UIL activities were found to be weak.

At the university level, there is better awareness of the importance of UIL in government universities of Ethiopia. However, the structure was not adequately decentralised to the college/school or department levels creating a loop between the top management and the lower management of the university. In some cases, the offices were not well-organised with adequate human, material and financial resources. As a result, the UIL managers were under pressure wasting their time on clerical works at the expense of other strategic issues. Hence, the result of qualitative data showed that UIL lacks proper organisation.

In relation to staffing, joint recruitment of professors and researchers was almost non-existent. However, staff externship programmes during their summer vacation, student's internship and some training programmes were underway between the universities and the industries.

Decision-making activities on matters related to UIL were dominated by the universities. It was argued that industries were not willing to attend meetings that were called for joint decision-making or they did not send the right person for these purposes. Moreover, management of intellectual property rights (IPR), and technology transfer activities from universities to industries or vice versa was low and insignificant.

The study also identified that students' internship was the major area of university-industry linkage followed by research, training and consultancy services. The teaching-learning process was also improved as the result of students' practical exposure to the real work environments. Moreover, resource share was also another area of linkage between universities and the industries.

The benefits obtained so far from UIL were dominated by students' internship programmes. As the result of this, the practical exposure of students to the real world of work has increased. Students were accustomed to the culture of industries, and they tried to relate the theory they had learnt in the university to the practical world. Industries were also benefitted from the universities in getting cheap labour, capacity-building, consultancy services and some limited research projects. Moreover, some universities increased their income as the result of consultancy services, as 10 percent

of the total income goes to the universities treasury. On top of this, universities and industries benefitted one another through resource share to some extent.

Qualitative data also found that university-industry linkage was constrained by several interwoven variables. In this regard, the study revealed that policy-practice gap, lack of trust and commitment between universities and the industries, financially related bottlenecks, the reluctance of the local industries and institutional challenges as the major constraints. Under each of the sub-topics, detail analysis was made.

Despite these challenges, as an opportunity, attempts were made by the universities to expose their students to the field of work. Universities started to give due attention to the importance of UIL. On the part of the government, designing different policies and strategies were taken as the opportunity. Currently, the government is looking UIL as the major tool to address its development agendas. On the other hand, blooming industries in the country were also perceived as the opportunity to promote UIL than ever.

To overcome those challenges, the results of the qualitative data obtained through interview and focus group discussion suggested that motivation of better performing industries, legal enforcement, and practical engagement of the universities in problem-solving activities, increasing awareness through publicising and sensitisation programmes. In addition to these, designing clear structure that runs from the top to the grass root level supported through uninterrupted monitoring and evaluation of UIL activities were commented by the study participants.

5.7. INTEGRATION OF PHASE I AND II

It was recalled that this study employed mixed approach, specifically convergent mixed research design as indicated in section 4.3.4.1. and 4.5 of this study. After analysis of both quantitative and qualitative data sets separately, comparison and integration of data were made.

Both the quantitative and qualitative data results showed that the level of management of university-industry linkage is at its infant stage of development in government

universities of Ethiopia. Major functions of management considered for this study like planning, organising, staffing and decision-making activities were found to be weak. Comparing these four functions, the data revealed that there was better performance in planning and staffing than organising and decision-making activities. Universities and industries have joint consultation programmes after they have prepared their plans independently. However, joint implementation and evaluation of the activities of UIL were found to be low. This study confirms with the finding of Hiwot (2014: 52) who has identified the low level of implementation in the management of UIL. This finding also proves the lack of strategic thinking of leaders in African universities to put plans into action as discussed in section 3.7.2. of this study.

In relation to staffing, joint recruitment of professors and researchers was non-existent. Staffing in UIL was limited to capacity-building areas especially for industry employees and staff externship programmes for university instructors. On the other hand, UIL was not clearly structured in both universities and industries. The activities were given to different ministries at the government level and making accountability issues difficult, which actually violets the principle of chain of command in management. Still more, the study found out that UIL offices were not adequately furnished with the required human, material and financial resources as reviewed in section 3.7.1. Despite these, there was resource share between the universities and the industries. The results of both quantitative and qualitative data also confirmed that joint decision-making activities were lacking between universities and industries in relation to UIL. Consequently, the results of both data strands support one another.

Universities and industries were expected to create a link in various areas (Refer section 3.3 of the review). In the case of Ethiopian government universities, students' internship was the major area of linkage. Following this, the study found out that training, research and consultancy services were the other areas of linkage. Specifically, students' internship has contributed to the improvement of the teaching-learning process by giving them the opportunity to test the work environment.

Contrary to this, UIL was weak in the areas of providing employment opportunities to graduates, leadership and management areas, curriculum development and sponsoring research projects (Refer section 3.7.4 & 3.7.5 the case in Africa).

Moreover, university-industry linkage was suffering from establishing joint laboratory and incubation centres. This has a great impact in both producing quality graduates and promoting innovation.

As pointed out above, universities mainly benefitted from the nearby industries by placing students in the industries for their practical exercise. However, industries mainly benefitted from the universities specifically in the capacity development and consultancy services received from the universities. Both of them have advantages in designing common research projects. Some experienced universities train demand-based graduates for industries by designing joint programmes.

From the integrated data, it was also possible to observe that university-industry linkage was constrained by several factors. The data pointed out that institutional challenges, policy practice gaps, contextual variation and information gaps, finance and awareness related bottlenecks, work overload, and facility related hurdles. In addition to this, the data identified that the lack of trust and commitment between universities and industries was the other pressing challenge for UIL. In fact, these challenges were related to leadership and management. These factors were worsened by the reluctance of the local industries to participate in the UIL.

The data also explored the existing opportunities to strengthen university-industry linkage further in the government universities of Ethiopia. From the perspectives of the government, the existence of policy platforms was identified as the opportunity. On top of this, the government gave due emphasis to UIL as the strategy to bring growth and transformation in the country. Similarly, the concern of the universities to link themselves with the industries was taken as the opportunity. It was becoming a day to day language especially in the fields of Engineering and technology; though, the practical exercise was lacking. Actually, this was supported by the growing number of universities in the country.

On the parts of the industries, it was recognised that the number of the industries are blooming in different parts of the country. Despite the reluctance indicated in the challenges, it was also identified that the willingness of the industries to work with the

universities had shown improvements. The distribution of these industries in different parts of the country could also be taken as the opportunity.

To alleviate the aforementioned challenges, the results of both the quantitative and qualitative data show that bridging policy practice gaps, motivating better performing industries, legal enforcement, increasing the participation of universities in problem-solving activities, arranging various advertising and sensitisation programmes, networking, building trust and commitment, designing clear structure with adequate responsibility and accountability were suggested. Finally, it was found out that conducting monitoring and evaluation activities was strongly suggested as the strategy to improve the current status of UIL in government universities of Ethiopia.

5.8. DISCUSSION OF QUANTITATIVE RESULTS AND QUALITATIVE FINDINGS

In this competitive world, knowledge resources have become the major driver of modern economic growth and development (Adeoti, 2009: 376). In addition to this, the university-industry partnership is regarded as the bridging culture on the part of two distinct entities academia and industry, which accelerates economic development (Ahmed & Jumani, 2013: 208). In this regard, this study underscored the importance of UIL for developing countries like Ethiopia (More detail is also discussed in section 3.8 of the review).

Cognisant of the above premises, this study sets to explore the level of management of UIL, its major areas of partnership, benefits obtained so far, challenges constraining this partnership and the existing opportunities from the perspectives of the government, university and the industries. Finally, it was designed to come-up with the strategies that foster UIL in government universities of Ethiopia.

To begin with, this study found out that the level of management of UIL in government universities of Ethiopia was weak in terms of joint planning, organising, staffing, and decision-making. As far as planning is concerned, both universities and industries have their own plans as per their own contexts. However, it was suggested by researchers that research themes should be identified in collaboration with the industry

and should be with the active participation of the government as the major financier of such collaboration while the industry is committed to employing useful outcomes of R& D (Adeoti, 2013: 384). Despite this, the value they give to UIL is quite different as they have their own area of focus. Industries mainly emphasise on issues related to profit maximisation while universities consider as their top priority agenda, as it was given to them as their third mission. However, universities were not at equal footing in considering this as their agenda. Universities invite industries for consultation purposes in which the industries were reluctant to attend the forum. This made the planning process less participatory; consequently, leading to the poor implementation of plans. This was supported by Hiwote, (2014: 52 & 60) who identified that university-level plans were failed to be implemented because of low enforcement of legal issues.

The level of organising resources (human, material and financial) resources for UIL was also found to be low. At the university level, the structure of UIL was not properly designed creating a loop between the offices at the centre and at the department level (Hiwote, 2014: 60). In addition to this, the offices were not fully furnished with the required manpower and facilities. This is again attributed to financial constraints attached to many universities found in developing countries, which was not an exception to Ethiopian government universities (Abraham, 2013: 61; Guimon, 2013: 2; Khan & Anwar, 2013: 271; ADEA, 2012: 8; AAU, 2012: 15). In addition to planning and organising, staffing and joint decision-making of activities were also lacking in government universities of Ethiopia. Joint recruitment and exchange of staff will lay podium for UIL. The study shows that universities that have boundary spanning individuals have better opportunities for UIL (Abraham, 2016: 9). Similarly, joint decision-making activities between universities and industries were also weak. Therefore, the level of management of UIL in government universities of Ethiopia is weak, which is mainly attributed to leadership and management as discussed in the review section, 3.7.2, of this study.

On the other hand, UIL covers a wide range of areas from academic and research support to consultancy services, joint establishment of research centres, innovation and technology transfer activities (Abraham, 2013: 54; Guimon, 2013: 2). From these wide ranges of activities, UIL was better in terms of students' internship areas followed by capacity-building, small research projects and consultancy services. As explained

by Guimon, (2013: 3) existing collaboration tends to be more informal and to focus on the firm's recruitment of university graduates for staffing, internship and consulting. He also maintains that the research activities of universities in developing countries are less likely to lead to spinoffs or patents that can be commercially exploited.

Universities and industries mostly collaborate for their mutual benefits. The study shows that universities obtain benefits like improving instruction, access funding, reputation enhancement and access to empirical study data from industries (Guimon, 2013: 3). On the other hand, industries benefit from the universities in accessing complementary technological knowledge (including patents and tacit knowledge), tapping into a pool of skilled workers, providing training to employees, accessing university facilities and equipment, and gaining access to public funding and incentives (Guimon, 2013: 3). Internees also contribute values to industries, acquire skills to supplement their knowledge, access different technological outcomes and may get employment opportunities (Abraham, 2013: 58). Actually, university-industry linkage helps the graduates to polish their talents and give them confidence at the workplace (Khan & Anwar, 2013: 271).

Research supports that university-industry linkage has both financial and non-financial benefits for both the universities and the industries (D'Este &Patel, 2007: 1296). Pertinent to this study, the benefits obtained from UIL in government universities of Ethiopia was mainly, the practical exposure of students to the real work environment through internships. Moreover, they have also benefitted through staff externship, which helped university instructors to improve their teaching-learning process. Some experienced universities also increased their income as the result of the consultancy services they provide to the nearby industries. Similarly, industries also have got training and consultancy services from the universities. Therefore, the benefits are bi-directional as discussed in the review section of this study (3.8.1-3.8.3.).

University-industry linkage (UIL) was constrained by several factors as discussed in section 3.7 considering the African context. In relation to this study, institutional challenges, policy-practice gaps, contextual variation and information gaps, finance and awareness related challenges, workload and facility related problems were

challenges that hindered the strengthening of UIL. These challenges were aggravated in turn by lack of trust and commitment, and poor leadership and management capacities. In addition to these factors, again, the reluctance of local industries to collaborate effectively and efficiently with the industries was found to be a big challenge. In a similar vein, Ahmed and Jumani, (2013: 210) have identified that industries do not want to cooperate with universities; they simply want to absorb the knowledge that they did not support.

As indicated in section 5.3.4.1., institutional challenges include lack of internal UIL policy at the university level, lack of strategy, problem-related to the management of intellectual property rights and the capacity of university professors in practically solving the problems of the industries. This was confirmed by Guimon, (2013: 4) who states that “collaboration is costly and returns only accrue in the medium to long run, but firms seek short-term results and clear contribution to current business lines”. Similarly, lack of practicality of policies and strategies at the university level (Hiwote, 2014: 60), problems related to the management of intellectual property rights (Hiwote, 2014: 52; Guimon, 2013: 4) were found as institutional challenges to UIL.

Policies designed at the national level have no meaning unless they are changed to practices. The current study revealed that what policies demand at the aggregate level and what is actually implemented at the grass root level is quite different. In addition to this, university’s aim is to promote research and innovation; whereas, industry seek immediate profit and intellectual property rights are maintained secrete untilthe adequate return is obtained (Guimon, 2013: 4).

Besides this, the demand of industries to universities was not properly understood because of information gaps. Relevant information on the quality of graduates, types of researches required, consultancy services provided, knowledge to be transferred, and so on remained blurred between the two because of lack of transparency and accountability.

Contrary to the above ideas, Khan and Anwar, (2013: 271) have maintained that through UIL, financial matters can be settled, which are ultimately beneficial to both universities and industries. However, this study found out that finance and awareness

related problems are the bottlenecks to promote university-industry linkage. Reasonable allocation of finance to the activities of UIL will alleviate problems related to research funding, facilities, the establishment of different technology incubation centres and technology transfer matters. Specifically, this study found out that, local industries were not adequately supporting UIL in financial issues. It was again argued that the capacity of the local universities in practically solving the problems of the industries is limited. This actually confirms with what was identified by Hiwote, (2014: 63) who upholds low potential of the academic staff in conducting applied research and technology-related issues. On the other hand, many instructors do not have adequate time to conduct research and involve in UIL activities as they were overloaded with teaching work. This was again attributed to the growing number of students who are joining government universities of Ethiopia. Still more, other academic staff members were discouraged by exaggerated government taxation from the consultancy and research works.

The other challenge to UIL in government universities of Ethiopia was related to facilities (Abraham, 2016: 1; ADEA, 2012: 8; AAU, 2012: 15; Teshome, 2008: 10). In the case of this study, universities do not have well established UIL offices, internet services, laboratory centres, technology incubation centres and other related infrastructures. Concomitantly, a study conducted by Hiwote, (2014:59) in Addis Ababa Institute of Technology even pointed out the existence of constraints on up to date models, software, chemicals and inefficient internet services required to strengthen the link. Some of the universities were located in peripheral areas where the numbers of industries were limited. However, research shows that for better performance of UIL the geographical proximity of industrial parks to universities matters worth (Adeoti, 2009: 385). This will enhance their capacity to share resources and actively engage in UIL activities.

As explained by Ahmed and Jumani (2013: 203), there is a need to bridge the gap between academician and industry by building confidence, trust and creditability as both speak different languages. However, this study also vividly showed that lack of trust and commitment between universities and industries as a pressing challenge to UIL. Loss of trust by the industries on the university research and expertise become an undeniable challenge to UIL (Hiwote, 2014: 65). As indicated in section 5.4.5.2 local

industries did not trust universities to solve their problems. This resulted in the reluctance of the local industries in funding research works, establishing joint research, technology incubation centres and technology transfer activities.

Leadership and management related challenges were also remained other hurdles to UIL (Refer also the discussion made in section, 3.7.2). Lack of supportive leadership was found to be a caveat to UIL. Concomitantly, Hiwote, (2014: 66) and Abraham, (2016: 1) explain that special challenge to UIL, is university-industry leadership themselves, who are not committed to organising, give priority to create a link. This implies that lack of focus on UIL from leadership will be counterproductive in obtaining the desired results.

Currently, there are opportunities to strengthen UIL in Ethiopia. The government designed policies pertinent to UIL at the ministry level. Moreover, the numbers of universities in the country are expanding at least quantitatively from two during the military government regime to 44 currently. This is, basically, an opportunity in pushing the knowledge frontiers through UIL, provided that the above challenges are addressed. On the other side, the number of industries in the country is also growing in different parts of the country (FDRE, 2016: 28). Still, the greater majority were concentrated at the centre of the country putting peripheral areas at the disadvantage positions. Despite this, the expansion of industries could be taken as the opportunity to create a link with the universities.

This study also cameup with some suggested strategies to solve the problems of UIL in the government universities of Ethiopia. From the suggestion of the participants, bridging the policy-practice gap was found as a strategy to minimise the problems of UIL. Policies designed at the central level were not properly put into practice at both the university and the industry levels. It did not get adequate attention from the parts of the industries. On the other hand, industries complain about the absence of any motivation mechanisms from both the government and the universities through various means. This study shows that motivating actively participating industries in UIL through tax deduction (Hiwot, 2014: 60) award and certification programmes at the national level were rarely implemented. In addition to the above ideas, study participants agreed on the importance of legal enforcement on unwilling industries as

they operate on nation's resources. On the parts of the university, they were strongly suggested to participate in practical problem-solving activities of the industries. Still more, sensitising and publicising programmes were commented by the study participants to alleviate the challenges discussed so far. This is because of the fact that UIL takes time and sustained effort especially in developing countries where there are limited experiences and less managerial capacity in research (Guimon, 2013: 3).

As discussed in section 3.7.2., it was also commented that creating a network with and among universities and industries both locally and internationally would enhance the problem-solving capacity of each partner. Moreover, building trust and commitment from each role players, designing clear UIL structure from top to bottom (in this case from the ministry to the university-industry) will minimise the challenge indicated. This was again suggested by participants with continuous and regular monitoring and evaluation system with up to date revision and correction of the observed gaps.

5.9. MODEL DEVELOPMENT

This section introduces the development of model emanated from the data. To begin, the problem of university-industry linkage was conceptualised in the Ethiopian context. Theories and models underlying university-industry linkage were discussed, and relevant literature in the context of the Ethiopian Education system was also addressed. Mixed research design with its pragmatism philosophy was applied, and data were gathered from the study participants using questionnaires, individual interview and focus group interviews. Both quantitative and qualitative data analyses were made and the result became the base for the developmentof model as follows:

Stage 1: Challenges to UIL in government universities of Ethiopia

As indicated in Figure 5.1, there were several challenges to UIL in government universities of Ethiopia. The model developed from the data shows that university-industry linkage was challenged by policy practice gaps, institutional challenges and lack of support from both university and industry leaders. Moreover, lack of trust and commitment, finance and awareness related challenges, and the reluctance of the

local industries were the challenges to UIL. As indicated in the model, these factors are overlapping to show their interaction effect to the overall implementation of UIL activities.

Stage 2: Opportunities to university-industry linkage

As indicated in Figure 5.1 again, this stage shows the existing opportunities to be adequately tapped to strengthen UIL in government universities of Ethiopia. The government gave due emphasis to the importance of UIL as explained in different policy documents. This is a nice opportunity to avert the challenges into opportunities. On the other hand, the model shows the focus and the expansion of universities as the opportunity to strengthen UIL. Moreover, the expansion of universities was also another opportunity to UIL.

Stage 3: Strategies to UIL

Strategies to promote university-industry linkage were identified from the data. Accordingly, the model shows that bridging policy practice gaps, sensitisation and advertising programmes were suggested as the strategies to promote UIL. In addition to this, it is depicted in the model that building trust and commitment, designing clear structure, practically solving the problems of the industries and monitoring and evaluation systems were the strategies to alleviate problems on a sustainable basis.

Stage 4: Short- and long-term impacts of UIL

The application of those strategies will lead to short and long-term advantages of UIL. In relation to this, Guimon (2013: 1) observes short-term collaborations from the perspectives of solving on-demand problems explained in terms of contract research, consulting and licensing, whereas, long-term collaborations are associated with joint projects and public partnerships like private funded university institutes or chairs, joint university-industry centres, and research consortia. Accordingly, the model depicts the short-term advantages obtained from the application of those strategies. Consequently, its application will lead to strong UIL, producing quality graduates, problem-solving researches, joint research projects and so forth.

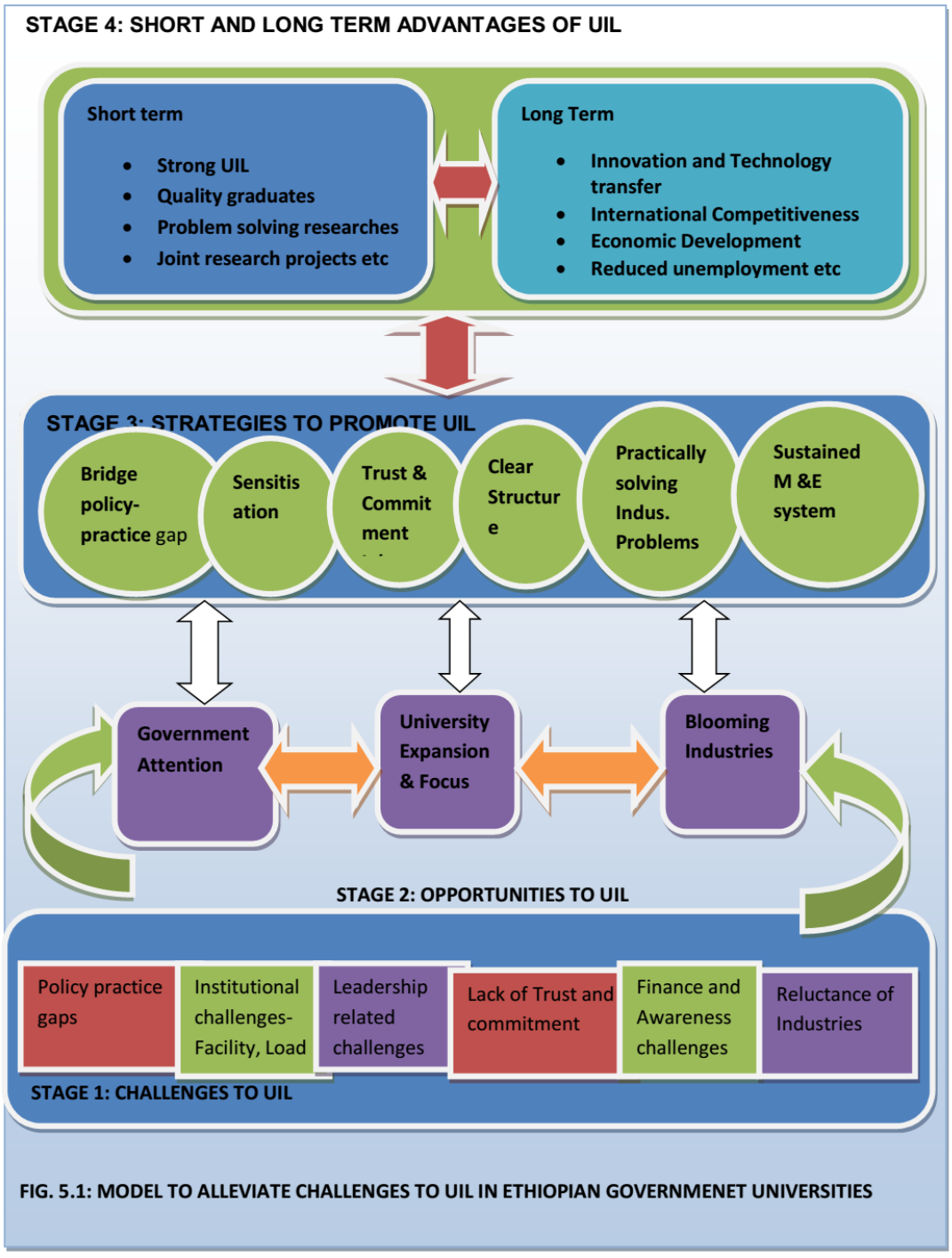

FIG. 5.1: MODEL TO ALLEVIATE CHALLENGES TO UIL IN ETHIOPIAN GOVERNMENET UNIVERSITIES

In its long-term, the application of strategies indicated in the model may bring international competitiveness, strong innovation and technology transfer and reduced

unemployment rates in the country as the system produces quality graduates that the country demands. Consequently, the economic development of the nation could be built. The arrows show the flow of information as well as the share of ideas among different entities or variables. This indicates the interaction effects among the variables explained in the model.

5.10. CONCLUSION

This chapter commences with the analysis of quantitative data obtained from the survey questionnaires. The analysis begins with biographic data of the respondents. Following this, analysis of data was made based on the basic questions and problem statements raised in chapter one. Both descriptive and inferential statistics were used in the analysis including mean, percentage, t-test, ANOVA and factor analysis using SPSS software version 23.

The second phase of the analysis was about the qualitative data obtained through interview and Focus group discussions. In the analysis, the data were categorised into six themes and 23 categories in which detail presentation of data was made. The voices of the participants from different groups indicated in the sample were heard through direct quotation of the responses of the respondents. In both phases, attempts were made to conclude the findings to grasp the result of the analysis.

After separate analysis of each of the data sets, integration of data was made to create the holistic view of the problem. Both quantitative and qualitative data were explained in relation to the basic questions stated. Next, discussion on the findings of two data sets was also made in relation to the researches made so far. Its implications were also explained in each of the findings. Finally, this chapter culminates with the development of a model that emanated from the integrated data sets. The model shows the identified challenges to UIL in government universities of Ethiopia, the existing opportunities, and strategies assumed to avert the observed challenges. In its higher level of abstraction, the model shows short term and long term impacts of putting the suggested strategies into practice. This will actually lead to the final chapter of the thesis.

CHAPTER SIX
SUMMARY OF THE RESEARCH, FINAL CONCLUSIONS AND RECOMMENDATIONS

6.1. INTRODUCTION

This final chapter of the thesis was the summary of the research including both summaries of the literature and empirical investigation. Key research findings and recommendations for future improvement were also parts of this chapter. Recommendations were forwarded in line with the problems identified and analysis made. Areas of future research for further investigation were suggested, and limitation of this study was indicated. Finally, this study ended with the concluding remark.

To begin with, this study was setout to investigate how university-industry linkage was managed in government universities of Ethiopia. In its background, it tried to assess global issues in relation to UIL, policy issues of the study contexts and importance of UIL. In this section, a knowledge claim was made on the idea that UIL was not properly managed in government universities of Ethiopia. Following this, the statement of the problem showing the existing knowledge gaps was also discussed from the existing literature. This chapter also included aims and objectives of the study, motivation to study, a brief presentation of the theoretical framework and research design and methodology. Finally, it culminated with the chapter outline of the whole research work.

6.2. SUMMARY OF LITERATURE RESEARCH

The literature for this study was divided into three parts. The first part was about the theoretical and conceptual framework for the study (Chapter 2), the second was about the global perspectives on UIL and the study contexts (Chapter 3), while the third was about research paradigm, design and methodology (Chapter 4).

Specifically, Chapter 2 begin with an introduction of the chapter itself followed by reviewing UIL from the global perspectives Section 2.1 and 2.2). It discussed the importance of UIL in relation to its demand for global competitiveness and knowledge-economy. The widely cited model to UIL, the Triple Helix model, and its three different

typologies were included (section 2.3). The statist, laissez-faire and the interactive types of the triple helix typology were discussed (section 2.3.1; 2.3.2; 2.3.3) and this study was viewed from the perspectives of the interactive/balanced triple helix model. In section 2.4, the role of each of the role players was also treated in this chapter. The role of the government (2.4.1), the universities (2.4.2) and industries (2.4.3) were included under this subsection. This section was important for the development of instruments and analysis.

In the second chapter, two important theories that were assumed to guide this study was included. The human capital theory and the systems theory were discussed in sections 2.5 and 2.6 respectively. The relevance of human capital theory was discussed from the idea that universities are the major producers of manpower required for the modern economy. Industries, on the other hand, are the major absorbers of this trained manpower and government uses this educated manpower as means to realise the country's development efforts by adding value to the economy through research, innovation and technology transfer. In a similar vein, Systems theory tried to link the three role players of the triple helix with the nearby environment. Its application to the educational institutions was discussed from different views (2.9). Lastly, this chapter came up with the conceptual framework of the study, by combining the triple-helix model with the human capital and systems theory viewpoints. This was included in section 2.10 of the chapter.

Chapter 3 was about global perspectives on UIL and an overview of the study contexts. It began with the introduction of the chapter in section 3.1. Following this, conceptualising UIL from the global perspective was discussed in this chapter. Rationales for UIL (3.3) and its historical developments were also treated briefly (3.4). For a better understanding of UIL, experiences of different countries from different parts of the globe were included in this chapter. Experiences of USA, UK, China and Japan were taken from developed world by taking into account their global contribution to UIL through innovation and technology transfer (section 3.5.1 to section 3.5.4). From Africa, where this study context was nested, Egypt from North, Nigeria from West, South-Africa from South and Kenya from East Africa were considered because of their global contribution to innovation (3.6). It was assumed that Ethiopia could learn from the experiences of these countries in relation to UIL.

In the context of Africa again, there were several challenges to UIL. In relation to this, several research works were reviewed for a better understanding of the study milieu (section 3.7). Consequently, literature identified that lack of supportive policy environment, poor leadership, low student enrolments, curriculum irrelevance, weak research outputs, and poor quality graduates were reviewed and discussed (sections 3.7.1 - 3.7.6). Moreover, benefits that could be obtained from successful UIL were discussed from the perspectives of economic development, social and cultural development and technology transfer (section 3.8). Each of these sub-topics was given separate sections and dealt with (sections 3.8.1- 3.8.3). This was again reflected in the model development.

This chapter also reviewed the study context from general to specific (section 3.9). It commenced with the political background of the country that divided into nine Federal states and two city administrations (section 3.9.1). It also presented the socio-economic contexts of the country (section 3.9.2). Discussions were made based on the demographic and economic contexts of the country. The industry sector, in this case including (manufacturing, construction and service sub-sectors), was presented (section 3.9.3). In this regard, the country is at its early stage of development. This sector was presented as one of the growing sector calling for better management of UIL. Finally, this chapter discussed the education sector and its underlying policy frameworks. The current education structure from primary to tertiary was included in this section (section 3.9.4). With greater emphasis, this section dwells on the expansion, privatisation, cost sharing and financial autonomy given to higher education institutions (section 3.9.4.4), in this case, government universities of Ethiopia. Lastly, the chapter concludes with the review of contents covered in the chapter (section 3.10).

The fourth chapter of this research was about research paradigm, design and methodology. In this chapter, mixed research approaches with its philosophical underpinnings- pragmatism was discussed in section 4.4. Ontological and epistemological considerations were also presented in line with the problem statements and basic questions (section 4.4.1). Complementarily nature of both quantitative and qualitative approaches and the rationale for using mixed research approaches were included in this chapter (section 4.4.2). To this end,

concurrent/parallel/convergent research design was explained in section 4.4.4.1. This design allows the collection of both data strands simultaneously and analysing them separately, merging the data and permits discussion for creating better results.

This chapter again examined data gathering instruments (section 4.5.1), survey questionnaires (section 4.5.1.1), individual interviews (section 4.5.1.2), focus group interviews/discussions (section 4.5.1.3) and document reviews (section 4.5.1.4) were used as the data gathering instruments. Data collection procedures (section 4.5.2), methods of data analysis and interpretation (section 4.6), validity and reliability of instruments (section 4.7), and research ethics (section 4.8) were parts of this chapter.

6.3. SUMMARY OF EMPIRICAL INVESTIGATION

This section summarises the results of empirical investigations obtained from both quantitative and qualitative data. Major findings in relation to the problem statement and research questions were presented. Cross-reference to the specific sections was also made for clear understanding.

To begin, the academic qualification of university instructors and managers had positive roles to play in strengthening university-industry linkages. However, 30.7, 62.7 and 6.4 percent of university instructors and managers were identified as first degree, Master's Degree and PhD/MD/DVM holders in the sample universities respectively (section 5.2). Still, a significant number of university instructors and managers were working below standard with a first degree in the sample universities. This had negative impacts on UIL as well as the quality of education.

6.3.1. Level of Management of UIL

The level of management of UIL in government universities of Ethiopia was found weak (sections 5.3.1.2; 5.4.3; 5.5 and 5.7). The grand mean for management functions considered for this study (Planning, organising, staffing and decision-making) (M=2.36) for educational managers and (M=2.27) for graduating students showed that the level of management was found low. This study also found that universities had links with the industries to some extent in limited areas. In terms of joint planning,

universities and industries prepare their own plans independently of one another. The lack of joint planning brought about challenges in prioritising UIL activities; consequently, led to the loss of focus. Joint implementation of plans, monitoring and evaluation of the activities of UIL, developing and revising curriculum were also low (sections 5.3.1.1 and 5.4.3). However, there were better performances in participation during planning.

Universities and industries tried to sign a memorandum of understanding (MoU) for joint implementation of the activities of UIL. However, the level of implementation was nothing more than paperwork in some universities and at its initial stage, even, in some experienced sample universities (section 5.4.3). UIL was again generally weak in a joint evaluation of the activities of UIL (M=2.21), developing curriculum collaboratively with the industries (M=2.15) and revising the implemented curriculum (M=2.16) (section 5.3.1.2).This partly created a skill gap between what the market demands and the graduates actually possessed.

The organisation of resources to strengthen UIL in government universities of Ethiopia was again found weak (sections 5.3.1.1.2; 5.5 and 5.7). Similarly, establishing common research and innovation centres with the industries (M=1.87) was below expectation. This was also exacerbated by low infrastructure development (M=1.83) and lack of joint establishment of different technology incubation centres (M=1.91). However, at the national level, there were better policy platforms for putting UIL into practice. Despite this, no separate entity was directly in-charge of managing UIL, as activities were given to MoST, MoE, and MoI. This resulted in the loss of focus.

At the university level, UIL was mainly limited to students' internship. Structurally, it was organised under the research and technology transfer vice presidents directly accountable to the scientific director. In some cases, they were directly answerable to the presidents (section 5.4.3). It lacks uniformity in its structure at the university level; similarly, this structure was not adequately linked to colleges and departments where actual implementation was assumed to be deep-rooted. On top of this, some UIL offices at the university level were not adequately organised with the required number of human, material and financial resources. They do not have adequate financial autonomy, with the limited scope of UIL activities, mainly, to the organisation of

students' internship alone. Consequently, shortage of work force in UIL offices created a burden to the managers as they were occupied by daily routine activities at the expense of other strategic issues.

In terms of staffing, joint recruitment of professors and researchers between universities and the industries was almost non-existent (sections 5.3.1.1.3; 5.4.3; 5.5 and 5.7). Moreover, they did not have a joint evaluation of the quality of graduates. However, universities and industries had some experience sharing programmes, and provision of consultancy services mainly by the universities to the industries. Some universities also send their academic staff to industries to fill their skill gaps through externship programmes during their summer vacation for two months.

At the university level, there was a hierarchical allocation of budget to UIL offices. However, the lion's share of the allocated budget goes to students' internship putting research and innovation activities on the marginal side.

In relation to decision-making, both universities and industries set common agenda for decision-making and made decisions on joint research projects at the moderate level (section 5. 3.1.1.4). However, putting those decisions into practice was minimal (M=1.88). In some cases, universities arrange conditions for consultation programmes with the industries. Despite this, decisions were made by the universities as the number of participants from industries was limited, or the right person was not sent to the meeting that calls for decisions on strategic issues (section 5.4.3).

At the university level, intellectual property rights (IPR) were loosely handled. The issue did not get adequate attention as it was linked to MoST. This has created a gap between the universities and the industries. Students' internship was the major area of UIL in government universities of Ethiopia (section 5.4.4). This was followed by consultancy services, provision of training and conducting joint research projects. The contribution of industries to improve the teaching-learning process through the development of curriculum, evaluation and revision was insignificant. Hence, the skill gap observed between the demand for industries and the university graduates was high, contributing to alarming graduate unemployment and underemployment rates in the country.

6.3.2. Areas of UIL

In addition to these, resource share between universities and the industries was another area of UIL (section 5.4.4.4). However, the share was limited to some extent, as universities did not know the industries, as the latter makes its gates close to the former. Surprisingly enough, industries within the country did not properly know one another. They did not have link among themselves. For instance, others export spare parts to other countries while others are importing from other countries while the product is here at a lower price in the country.

6.3.3. Benefits obtained from UIL

Benefits obtained so far from UIL in government universities of Ethiopia include practical exposure of students to the industries, financial support, capacity building, research and consultancy services, and resource share (section 5.4.5). As the result of UIL, students become aware of industry culture, work ethics, organisational structure and related bureaucracies. Universities also obtained some financial support as the result of consultancy services they provided to industries. On the other hand, industries benefitted through capacity-building training provided to them by the universities. These items were rated at the moderate level. Universities were less benefitted in the areas of receiving funds, leadership and management, curriculum and development and revision, establishing common technology centres and provision of employment opportunities to graduates.

6.3.4. Challenges to UIL in government Universities of Ethiopia

University-industry linkage (UIL) was challenged by several factors in government universities of Ethiopia (sections 5.4.6 and 5.3.4). Institutional challenges (section 5.3.4.1; 5.4.6.5), contextual variation and information gaps (section 5.3.4.2), finance and awareness related bottlenecks (sections 5.3.4.3 and 5.4.6.3), work overload and facility related hurdles (section 5.3.4.4) and leadership related challenges (section 5.5.4.5) were found as the major constraints. In addition to these, policy-practice gaps (section 5.3.6.1), the reluctance of the local industries and lack of trust and

commitment (section 5.4.6.2) between the universities and the industries were also pointed out as the major hindering factors.

Institutionally, universities lack internal policies and strategies that help them to guide the activities of UIL. Moreover, they did not have well organised IPR management mechanisms. University professors were criticised based on the ground that they did not have adequate capacity to solve industry problems. This research also found out that the existence of contextual variation and information gaps between universities and the industries as the other challenge. Lack of communication and autonomy, information gaps, geographical location of industries and the existing cultural differences between academia and the industries were the challenges that hindered UIL.

UIL in government universities of Ethiopia was also entangled with financial and awareness related challenges. Lack of adequate funding, low understanding about UIL and unwillingness of the local industries to work collaboratively with the universities were found as the major caveats in this regard. Work overload and facility related challenges were also the other problems to strengthen UIL. University instructors and researchers were overburdened by teaching loads in the universities. This had limited their opportunity to interact with the industries. This was aggravated by poor infrastructure development to promote UIL. University-industry linkage (UIL) was again challenged by lack of committed and visionary leaders. The absence of clear structure and lack of supportive leadership, who thinks strategically to advance innovation and technology transfer activities were lacking both from the universities and the industries based on their area of excellence.

The other challenge to UIL was policy-practice gaps. As indicated earlier, the government gave due attention to the promotion of UIL through different proclamations. However, the policies were not properly put into practice because of loose structure that links the central level policies to the implementers at the university and industry levels. The other pressing challenge to UIL in government universities of Ethiopia was lack of trust and commitment between the two parties. Local industries did not trust universities. This was argued due to the lack of practical engagement of universities in solving the problems of the industries. Industries need immediate and

on spot solutions to their problems, as they were looking for short-term profits. On the contrary, universities need long-term projects, which may bear lasting impacts. By and large, industries did not have trust in what the domestic universities were doing.

6.3.5. Opportunities to promote UIL

Despite the above-identified challenges, this study explored the existence of opportunities that could serve as the base for designing strategies (Refer to sections 5.3.5. and 5.4.7). Accordingly, this finding shed light on the existence of policy platforms that supports UIL at the national level and increased awareness of university leaders in supporting UIL and improvement in resource allocation to these activities as compared to the previous times. UIL does not operate in a vacuum. It demands the expansion of universities, which were considered as an opportunity. Despite their challenges related to quality, it was taken as a nice milestone for industries to solve their problems through research, capacity building, consultancy and technology transfer. The blooming industries were also identified as another opportunity to increase UIL. The number of industries established in different parts of the country was taken as the opportunity if they would take the commitment to work with the universities. Moreover, they were receiving cheap manpower from universities that may add value to their products. Through this, they may expose themselves to the current international competitiveness in the global market. Therefore, it was indicatedas an opportunity to build collaboration between universities and the industries. Governments' plan to establish different industrial parks in different parts of the country was also another opportunity for the universities to exchange knowledge, skill and experiences adequately between the two parties.

6.3.6. Strategies to promote UIL in government universities of Ethiopia

From the study again, bridging policy-practice gaps, publicising and sensitisation programmes, strong networking, building trust and shared vision, motivation and legal enforcement, practical engagement in the problem-solving activities with the industries and designing clear structure were suggested by the study participants to solve UIL related challenges (Refer to sections 5.3.6. and 5.4.8).

6.4. KEY FINDINGS

This study attempted to examine how university-industry linkage was managed in government universities of Ethiopia. To this end, mixed research approach specifically, the concurrent design was used, and the results showed that qualitative data results support/corroborate the qualitative result. Accordingly, the following key findings were identifiedin relation to the basic questions.

- The level of management of UIL in government universities of Ethiopia was found weak in planning, organising, staffing and decision-making. A strong partnership between them was not fully established.

- UIL in government universities of Ethiopia was dominated by students' internship followed by consultancy services, provision of capacity-building training, and conducting some limited joint research projects.

- Practical exposure of students to industries, financial support, capacity-building training, research and consultancy services, entrepreneurial and skill developments and resource share were some of the benefits obtained from the linkages.

- UIL was challenged by institutional bottlenecks, contextual variations and information gaps, finance and awareness related hurdles, work overload and facility related caveats, and leadership related challenges. On top of this, policy-practice gaps, the reluctance of the local industries, lack of trust and commitment between universities and industries were also the other worth noting challenges.

- The study found out that government attention to promoting UIL by designing various policies, strategies and guidelines were identified as the opportunities. Besides to this, the expansion of universities in different parts of the country was considered as the fertile ground for the strengthening of UIL. On top of this, the expansion of industries was also another promising opportunity to strengthen the linkages.

6.5. RECOMMENDATIONS FOR THE IMPROVEMENT OF PRACTICES

In line with the problems identified, the literature reviewed, the analysis made and from empirical results obtained in previous chapters (Sections 5.3.6; 5.3.7; 5.4.8; 5.5; 5.7; 5.8; 5.9), the following recommendations are forwarded for the improvement of practices of UIL in government universities of Ethiopia.

6.5.1. Improving leadership and management related challenges

Managing university-industry linkage was found weak in government universities of Ethiopia in terms of planning, organising, staffing and decision-making. Improving this demands qualified, competent and experienced leadership from both the industries and the universities. This calls for the professionalisation of leadership to strengthen UIL through short and long-term training to acquaint them with the leadership theories and practices. This will help them to improve problems observed in joint planning, implementation and evaluation of activities.

On top of this, both university and industry leaders should build a sense of ownership, belongingness, trust and commitment in promoting UIL. This is justified on the ground that the development of the country is directly linked to the quality of educated manpower that are capable of participating in problem-solving researches, innovation and technology transfer activities. In relation to this, UIL demands the industry leaders who are willing to work enthusiastically with the universities for the mutual benefits to bring about change in the lives of the society.

In addition to this, universities and industries were suggested to pull resources together for their common purposes. In areas where resources are scarce than expected, like in the case of Ethiopia, resource share and efficient utilisation of the existing resources seems mandatory than a matter of preferences. This could be improved when leaders from both the universities and industries actively participate in UIL. In relation to this, one major strategy to improve leadership practices of UIL is through creating participatory leadership in which the industry representatives could take part in the management of university affairs, like as board members.

6.5.2. Paradigm shift in the roles of the universities

Transforming the role of universities from teaching dominated to entrepreneurial and developmental universities, in which, universities take their lion-share in development activities through research, innovation and technology transfer activities is more important. From this study, Ethiopian government universities were dominated by providing teaching, consequently, UIL was overwhelmed by students' internship.

To remain competent, Ethiopian government universities should dramatically up-lift themselves from teaching dominated culture to research, innovation and problem-solving centres whereby university instructors fully engage themselves in development agendas of the country. To arrive at this point, capacitating universities by involving students, industry employees, university instructors and researchers on innovation and problem-solving activities through their practical engagement is strongly suggested. In line with this, different motivation mechanisms have to be launched for university leaders, instructors and students who are actively engaging themselves in UIL compared with their practical results. This will help as the synergy between the universities and the industries, and makes the relationship knowledge-based and long-lasting.

Government universities of Ethiopia are expected to move *'great leap forward'* in terms of fulfilling facilities such as ICT centres, establishing joint lab centres with the industries, research and technology incubation centres. Concomitantly, they should actively engage themselves in commercialising their research outputs to the market by collaborating with both domestic and international industries. Moreover, creating a conducive and attractive work environment in which instructors and researchers vigorously engage themselves seem to be equivocally important and supported by reasonable incentive programmes in relation to its development advantages to the country. The establishment of these centres and fulfilling facilities may demand huge money that could be obtained from government treasury, support of industries, universities internal revenue and through projects from external sponsorships by strengthening linkages. Above all, efficient utilisation of the existing resources through prioritisation of activities, as it remains the issue that should not be surpassed in this regard.

6.5.3. Bridging policy-practice gaps

This study found that the existence of policy platforms in linking universities with the industries. However, the actual implementation was lacking. To alleviate these challenges, it is strongly suggested that solving structure related problems seems important as UIL was given to three different ministries (MoE, MoST and MoI). It is obvious that there are activity interdependences and overlaps in addressing different development agendas at the country level. However, to solve this challenge, it seems relevant to establish separate Agency pooled (represented) from the three ministries, which could regularly follow-up and support the issue of UIL. It could either be accountable to MoE or MoST.

Another important point that warrants attention is the need for applying legal enforcement to unwilling industries as they operate on and with nation's resources. They should not turn back researchers and student internees from the gate, as they have to contribute to the development efforts of the society. In fact, this has to be a part of their agreement during their establishment, as they are accountable to contribute to the development of the society in general. On the other hand, the government may consider their contribution through a tax deduction, duty-free export of new brand items resulted from UIL, etc.

The rift between policy and practice could also be bridged through sustained monitoring and evaluation systems. Any managerial activity indicated above was nothing, unless, they are supported by strong monitoring and evaluation mechanisms. UIL should also be one major standard tool for ranking and allocating resources to universities. In each of the stages, developing and applying context based standardised monitoring and evaluation instruments seem important.

6.5.4. Networking

University-industry linkage is all about networking. In the era of globalisation, either industries or universities cannot remain alienated from one another as the former primarily have skills whereas the latter have knowledge.

In reference touniversity-industry linkage, there should be a strong inter-university relationship for exchanging resources, experiences and technology transfers. Internationally, domestic universities are expected to create a partnership with universities outside the country and across the globe especially with better performing universities in relation to UIL. This will help them to obtain experiences and adjust their own activities accordingly.

Within the country, it is also suggested that creating 'brand specific' universities linked to known business agencies and corporations like telecommunications, Ethiopian Aviation Authorities, Commercial Banks of Ethiopia, Ethiopian Electric Corporations and so forth are important to support research and innovation activities in the country. This could be facilitated by joint recruitment of professors and researchers who can work trans-boundary activities. They are often called boundary-spanning individuals.

The other point that again demands special attention is bridging geographical distances between universities and industries. In response to this, to reduce unemployment rates inthe country, the Ethiopian government is on the way to establish various industrial parks in different development corridors of the country. There should be an agreement from the outset that they should agree to work with the nearby universities. In this regard, creating regional universities/cluster universities seems important, in which they can adequately share human, material, and other related resources.

6.5.5. Arrange various sensitising and advertising programmes

In relation to the recommendation given so far, to improve the management of UIL in government universities of Ethiopia, it is again strongly recommended to go beyond arranging forums and conferences at the national level alone. The issue of UIL should get strong media coverage, disseminated to the public through different publications, newspapers, pamphlets, websites and various electronic means.

In addition to this, awarding and acknowledging better performing universities and industries at the national level will increase their concern to promote UIL. Individual leaders, researchers and instructors from both the universities and industries with

better achievements could also be acknowledged. At the university level, acknowledging actively participating industries is strongly recommended to promote UIL on a sustainable basis. As indicated earlier, tax deduction, duty-free export of brand new products of UIL could also be taken as a means to motivate industries.

6.6. AREAS OF FURTHER RESEARCH

University-industry linkage covers broader areas both from the more traditional role of teaching mission, which includes student placement, staff exchange, consultancy services, training, joint R&D to recent areas of creation of spin-offs for joint commercialisation of R&D products and the development of consortia (Abraham, 2016: 2). Consequently, detail research could be made in areas of student internship programmes especially, on its effectiveness and challenges. Moreover, research could be done on areas of national innovation systems, the process of technology transfer between universities and industries, management of intellectual property rights and so forth. University or industry-specific case studies could also be an area of further research forin-depth understanding of specific issues that call for immediate action for improving performances.

6.7. LIMITATIONS OF THE STUDY

This study covered seven universities from Northern, Southern, Eastern and Western corners of the country based on their establishments. Only first and second generations were included in the study as the third generations were under construction during this study period. Therefore, it may not show the holistic view of UIL activities in the government universities of Ethiopia. Moreover, this study did not show detail matters specific to universities, hence it could not be taken as problem-free research. However, attempts were made to minimise its limitation through designing of appropriate sampling techniques, prior communication with the study participants and frequent reviewing of the research procedures.

6.8. CONCLUDING REMARKS

UIL is a vital instrument in putting country's economy in the competitive advantage in the global market. It is a means to foster economic development and bring holistic change in the livelihood of the citizen through research, innovation and technology transfer. Despite this strong argument, UIL in government universities of Ethiopia is at its infant stage of development mainly overwhelmed by traditional roles of teaching. Consequently, partnership/ linkage between the two parties was not fully established on trust basis yet. To this end, the relation between the two parties was limited to students' internship, consultancy, training and some joint research projects. Moreover, the two parties have benefitted through practical attachment, resource share, financial support as the result of the consultancies and capacity-building.

On the contrary, UIL in government universities of Ethiopia were suffering from institutional challenges, explained in the form of lack of internal policies and strategies in relation UIL and lack of practically solving the problems of the industries on the parts of the universities. Similarly, the existence of contextual variation and information gaps between universities and the industries were other pitfalls. Communication problems, information gaps, geographical dispersion of industries (mainly concentrated at the centre) and the existence of cultural differences between universities and industries were found to be a challenge. On top of this, finance and awareness related challenges, the unwillingness of local industries, work overload of university instructors, facility problems, lack of visionary and committed leaders from both sides, the absence of clear structure, the existence of policy-practice gaps were the challenges identified. The other pressing problem related to UIL was lack of trust and commitment between the two.

However, it could also be concluded that these challenges could be averted to opportunities as the government gave attention to UIL through policies, strategies and directives. Still more, the number of universities in the country is expanding at least quantitatively, and the number of industries is concomitantly blooming leaving green space for creating linkages. Consequently, to tap these opportunities adequately, it was recommended that improving leadership and management capacities through training, encouraging universities to shift their roles to their third mission, bridging

policy practice-gaps, creating strong and sustained networking system, and arranging different sensitisation and publicising programmes. Finally, it was suggested to conduct context specific researches to solve the problems of UIL practically in government universities of Ethiopia.

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APPENDIX [A]: PROOF OF REGISTRATION TO UNISA 2017

UNISA | college of education

335 M1RST

BAREKE M L MR STUDENT NUMBER: 5079-229-6

MISGANU LEGESSE

P O BOX 419 ENQUIRIES NAME:

POSTGRADUATE QUALIFICATIONS

DILLA UNIVERSITY

ENQUIRIES TEL: (012) 441-5702

DILLA, ETHIOPIA

DATE: 2017-02-13

Dear Student

I wish to inform you that your registration has been accepted for the academic year indicated below. Kindly activate your Unisamylife (https://myunisa.ac.za/portal) account for future communication purposes and access toresearch resources. Please check the information below and kindly inform the Master's and doctoral section onmandd@unisa.ac.za on any omissions or errors.

DEGREE: DED (EDUC MANAGEMENT) (98437)

TITLE: Managing university-industry linkage in government universities of Ethiopia: challenges and opportunities

SUPERVISOR: Prof GM STEYN

ACADEMIC YEAR: 2017

TYPE: THESIS

SUBJECTS REGISTERED: TFEDM05 D ED - EDUCATIONAL MANAGEMENT

A statement of account will be sent to you shortly.

If you intend submitting your dissertation/thesis for examination, complete form DSAR20 (Notice of Intention to submit) before 30 September. If this deadline is not met, you need to re-register and submit your intention forsubmission by 15 April and submit your dissertation by 15 June.

Your supervisor's written consent for submission must accompany your notice of intention to submit.

Yours faithfully

Prof QM Temane
Registrar (Acting)

APPENDIX [B]: ETHICAL CLEARANCE FROM UNISA

UNISA university of south africa

COLLEGE OF EDUCATION RESEARCH ETHICS REVIEW COMMITTEE

16 November 2016

Ref : **2016/11/16/50792296/19/MC**
Student : Mr ML Bareke
Student Number : 50792296

Dear Mr Bareke,

Decision: Approved

Researcher: Mr ML Bareke
Tel: +251463312564
Email: misganul@yahoo.com

Supervisor: Prof T Steyn
College of Education
Department of Educational Leadership and Management
Tel: +2782 886 7468
Email: steyngm1@unisa.ac.za

Proposal: Managing university industry linkage in government universities of Ethiopia: Challenges and Opportunities

Qualification: D Ed in Education Management

Thank you for the application for research ethics clearance by the College of Education Research Ethics Review Committee for the above mentioned research. Final approval is granted for the duration of the research.

The application was reviewed in compliance with the Unisa Policy on Research Ethics by the College of Education Research Ethics Review Committee on 16 November 2016.
The proposed research may now commence with the proviso that:

1) *The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.*
2) *Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the College of Education Ethics Review Committee. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.*

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

3) *The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.*

Note:
The reference number **2016/11/16/50792296/19/MC** *should be clearly indicated on all forms of communication [e.g. Webmail, E-mail messages, letters] with the intended research participants, as well as with the College of Education RERC.*

Kind regards,

Dr M Claassens
CHAIRPERSON: CEDU RERC
mcdtc@netactive.co.za

Prof VI McKay
EXECUTIVE DEAN

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

APPENDIX [C]1 SUPPORT LEADER FROM DILLA UNIVERSITY

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Dilla University
Research &Dissemination Dir/Office

Ref. No Du/4-8136/7
Date 24/11/16

To: Adama Science and Technology University
Bahir Dar University
Dire Dawa University
Haramaya University
Hawassa University
Mekele University
Wollega University
Ministry of science and Technology
Ethiopian Telecommunication
Commercial Bank of Ethiopia

Subject: **Request for support**

Mr. Misganu Legesse is a staff member of Dilla University who is currently a PhD student in UNISA (University of South Africa). He has requested our office to write a support letter to different Universities and Organizations so that he could get a written letter of support to different government organization in the country.

Therefore, we kindly request your good office to provide him a support so that he could gather appropriate data for his study. We appreciate your kind cooperation as usual.

Kindest Regards

CC:
- Re/Te/T/V/President Office
- Research & Dissemination Office

D.U

APPENDIX [C]2: SUPPORT LEADER FROM DILLA UNIVERSITY

Dilla University
Research & Dissemination Dir/Office

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Ref. No. DU-4-8/3pr1
Date 08/09/08

To: **EFDRE, Ministry of Education**

- **Ministry of science and Technology**
- **Ethiopian Telecommunication –South Region**
- **Ethiopian Telecommunication –East Region**
- **Addis Ababa Metal Engineering Technology Corporation (METEC)**
- **Addis Ababa House Development Agency**
- **National association for Ethiopian Industries**
- **Commercial Bank of Ethiopia Hawasa District**
- **Commercial Bank of Ethiopia Shashamane District**
- **Commercial Bank of Ethiopia Adama District**
- **ETAB Soap Factory**
- **Emnete Endeshaw Construction**
- **BGI Ethiopia Beer Factory (Hawassa Branch)**
- **Afro-Tsion Construction Company**
- **Adama Automotive industry**

Subject: **Request for support**

Mr. Misganu Legesse is a staff member of Dilla University, who is currently pursuing his doctoral studies at university of South Africa (UNISA) on the title ***"Managing University-Industry linkage in Government Universities of Ethiopia: Challenges and Opportunities"***. He requested our office to write support letter to different organizations so that he could get access to data from these organizations.

Therefore, we kindly request your good office to provide him pertinent information that is relevant to his area of research. Our university appreciates your kind cooperation as usual in advance.

Kindest Regards

Asebe Regassa Debelo (PhD)
Research & Dissemination Director

CC

- **Re/Te/T/V/ President's Office**
- **Research and Dissemination office**
- **Misganu Legesse**
  DU

Dilla University

APPENDIX [D] TEMPLATE FOR REQUESTING PERMISSION TO CONDUCT RESEARCH

Sep. 18, 2016

Request for permission to conduct research at Ethiopian Government Universities

Title: "Managing university-industry linkage in government universities of Ethiopia: challenges and opportunities."

Misganu Legesse Bareke
Department of Educational Leadership and Management
251 911944488, Email- misganul@yahoo.com

To: The Ethiopian Ministry of Education

Dear sir/ Madam;

I, Misganu Legesse Bareke, am doing research with Prof GM Steyn, a research professor in the Department of Educational leadership and management towards a DEd at the University of South Africa. I kindly request the ministry to write a permission letter to universities to conduct research on the topic entitled **<Managing university-industry linkage in government universities of Ethiopia: Challenges and opportunities**>.

The aim of this research is to investigate the way in which the linkage between universities and industries be managed to produce qualified manpower for the industry so as to promote the overall development of the country.

The study will entail that collection of both quantitative and qualitative data is important to enrich the finding. The benefits of this study will help policymakers, universities and industries to strengthen the linkage. Actually, the research has no potential risks on the respondents and the organisation. The feedback of the research will be provided to the ministry through publications, conferences and seminars.

Yours sincerely

_____

MisganuLegesseBareke

DEd candidate

APPENDIX [E]: QUESTIONNAIRE FOR DEPARTMENT HEADS AND COLLEGE DEANS

UNISA | college of education

QUESTIONNAIRE TO BE FILLED BY DEPARTMENT HEADS AND COLLEGE DEANS

Dear respondent;

This questionnaire forms part of my doctoral research entitled: **<Managing University-industry Linkage in the Government Universities of Ethiopia: Challenges and Opportunities>**for the degree of Doctor of Education (DEd) at the University of South Africa. You have been selected by simple randomsampling strategy from the population of 2,487. Hence, I kindly, invite you to take part in this survey.

The aim of this study is to investigate how university-industry linkage is managed in government universities of Ethiopia. The findings of the study will benefit universities, industries and the government by suggesting some feasible strategies for strengthening university-industry linkage.

You are kindly requested to complete this survey questionnaire, comprising three major sections as honestly and frankly as possible and according to your personal views and experiences. No foreseeable risks are associated with the completion of the questionnaire, which is only used for research purposes. The questionnaire will take approximately 25-30 minutes to complete.

You are not required to indicate your name or organisation, and your anonymity will be ensured; however, an indication of your age, gender, occupation position, etcetera, will contribute to a more comprehensive analysis. Your participation in this survey is voluntary, and you have the right to omit any question if so desired, or to withdraw from answering this survey without penalty at any stage. After the completion of the study, an electronic summary of the findings of the research will be made available to you on request.

Permission to undertake this survey has been granted by Research and dissemination office of Dilla University, Ministry of Education and the Ethics Committee of the College of Education, UNISA. If you have any research-related enquiries, they can be addressed directly to me or my supervisor. My contact details are: Misganu Legesse Bareke e-mail: misganul@yahoo.com and my supervisor can be reached at Professor GM Steyn, steyngm1@unisa.ac.za (e-mail); +27 12 664 4256(h);+2782 886 7468(c) or+27 86 642 1645(f).

By completing the questionnaire, you imply that you have agreed to participate in this research.

GENERAL DIRECTION:

- **Put "√" mark infront of your choice where you think it is more relevant;**
- **Write your answers on the blank spaces provided for the open-ended questions with clear handwriting as much as possible;**
- **There is no right or wrong answer for the questions, and feel free to respond to the items indicated, as per your contexts.**

PART- I. GENERAL INFORMATION

1. Your university_____
2. College/faculty/school/institute_____
3. Department_____
4. Gender: Male ☐ Female ☐
5. Age: 20-25 ☐ 31-35 ☐ 41-45 ☐ 51 and above ☐
   26-30 ☐ 36 -40 ☐ 46-50 ☐
6. Educational qualification
   Diploma ☐ MD/PhD ☐
   BA/ BSc ☐
   MA/) MSc ☐ Others (Specify ☐
7. Academic Rank
   Graduate Assistant ☐ Assistant Professor ☐
   Assistant Lecturer ☐ Associate Professor ☐
   Lecturer ☐ Professor ☐
   MD speciality others (Please specify)---------- ☐
8. Area of specialisation _____
9. Year/s of service at the university_____

PART-II- LEVEL OF MANAGEMENT OF UNIVERSITY-INDUSTRY LINKAGE (UIL)

Managing university-industry linkage can be seen from planning, organising, staffing and decision making perspectives. Please rate the level of practice of each of the items as per your university. 5= Very High, 4= High, 3= Average, 2= Low, 1=Very low

NO	ITEM	Rating				
		5	4	3	2	1
1	**Planning Sub-theme: The extent to which your university**					
1.1	Participates industries on the planning of UIL					
1.2	Assesses the existing situation on UIL jointly with industries					
1.3	Sets common directions(vision, mission, etc.) with industries					
1.4	Sets priorities with industries in strengthening linkages					
1.5	Implements UIL plans with industries					
1.6	Monitor the activities of UIL with the industries					
1.7	Evaluates the activities of UIL jointly					
1.8	Develops curriculum collaboratively with industries					
1.9	Revise the implemented curriculum jointly with the industries					
	Others (if any)					
2	**Sub-item: organising** **The extent to which your university:**	**5**	**4**	**3**	**2**	**1**
2.1	Organises resources for technology transfer with industries					
2.2	Establishes research and innovation centres with industries					
2.3	Develops infrastructure (ICT, Offices, etc.) for UIL with industries					
2.4	Establishes different technology incubation centres jointly					
2.5	Allocates financial resources for UIL activities adequately					
2.6	Others (if any)	**5**	**4**	**3**	**2**	**1**
3	**Sub-theme: Staffing** **The extent to which your university:**					
3.1	Jointly fulfils manpower required for UIL					
3.2	Exchanges experiences through training with industries					
3.3	Exchanges manpower through consultancy services					
3.4	Recruitments of individuals jointly with industries					
3.5	Assesses the quality of graduates with industries					
	Others (if any)					
4	**Sub-theme: Decision Making** **The level at which your university:**	**5**	**4**	**3**	**2**	**1**

4.1	Sets common agenda for decision on UIL with industries					
4.2	Participates industries actively on decision making					
4.3	Considers range of options for decision making on UIL					
4.4	Chooses from range of options based on their advantages and disadvantages					
4.5	Participate industries on implementing decision on UIL					
4.6	Makes decision on joint research projects					
4.7	Makes decisions on establishing common research centres					
4.8	Makes decision on setting priorities in areas of technology transfer with industries					
4.9	Others (if any)					

10. Do your department/ college have linkage with any industries?

Yes ☐ **No** ☐ **I do not know** ☐

PART-III-AREAS OF UNIVERSITY-INDUSTRY LINKAGE

11. If your response for question No. 10 above is "yes", in **which areas does your university have better linkage?** State your level of agreement. The weighted value for Strongly Agree =5; Agree =4; Undecided =3; Disagree = 2; and Strongly disagree=1

NO	**ITEM**	**Rating**				
	My university has strong linkage with industries in:	**5**	**4**	**3**	**2**	**1**
11.1.	Research and academic support areas					
11.2.	Leadership and management areas					
11.3.	Curriculum development					
11.4.	Joint research projects					
11.5.	Sponsoring research works					
11.6.	Establishment of common technology centres					
11.7.	Student placements/ Apprenticeship					
11.8.	Provision of joint training programmes					
11.9.	Direct employment opportunities for graduates					
11.10.	Providing consultancy services					
	Other (if any)					

12. If you believe that there is a linkage between the two, whom do you think that more benefited from the linkages?

University ☐ Industry ☐ Both ☐

PART-IV-BENEFITS OF UNIVERSITY-INDUSTRY LINKAGE

13. If your response to the above question is either of them or both, please, in which areas does your university **have actually benefitted more**? State your level of agreement. The weighted value for Strongly Agree = 5 agree =4 Undecided =3 Disagree = 2Strongly disagree=1

NO	ITEM	Rating				
	My university benefited from industries more in:	**5**	**4**	**3**	**2**	**1**
13.1.	Providing funds for research works					
13.2.	Leadership and management training					
13.3.	Curriculum development and revision					
13.4.	Development of joint research projects					
13.5.	Establishment of common technology centres					
13.6.	Student placements/ Apprenticeship					
13.7.	Provision of joint training programmes					
13.8.	Direct employment opportunities for graduates					
13.9.	Increased income as the result of consultancy services					
13.10.	Identifying specific areas of their training need					
	Other (if any)					

PART-V- CHALLENGES OF UIL IN ETHIOPIAN GOVERNMENT UNIVERSITIES

14. The following items **state challenges that can hinder the positive outcomes of UIL**. Please rate the impacts of each of the items as per your university. The weighted value for Very High =5; High= 4; Average =3; Low =2; and Very low =1

NO	ITEM	Rating				
		5	**4**	**3**	**2**	**1**
14.1.	Low understanding about UIL					
14.2.	Lack of adequate funding for the linkages					
14.3.	Unwillingness of the local industries					
14.4.	Work overloads of university instructors (Administrative and teaching workloads)					
14.5.	Lack of well-organised infrastructure (transport, ICT etc)					
14.6.	Lack of supportive leadership from both the industry and the university					
14.7.	Absence of clear guidelines/policies on UIL at national level					
14.8.	Lack of capacity on the parts of university professors					

14.9.	Absence of internal UIL policy at university level					
14.10.	Lack of institutional strategy at university level					
14.11.	Problem related to intellectual property rights					
14.12.	Absence of clear structure that links with industries					
14.13.	Cultural difference between academia and industries					
14.14.	Geographical location of universities and industries					
14.15.	Lack of autonomy to work with the industries					
14.16.	Lack of adequate information on market gaps for innovation					
14.17.	Poor communication between university and industries					
	Others (if any)					

PART-VI-OPPORTUNITIES FOR UNIVERSITY-INDUSTRY LINKAGES

15. The following issues can be taken as the opportunities in strengthening university-industry linkage. Please, state your level of agreement in relation to the items indicated. The weighted value for 5= Strongly Agree 4= agree 3= Undecided 2= Disagree 1= Strongly disagree

NO	**ITEM**	**Rating**				
		5	**4**	**3**	**2**	**1**
15.1.	There is fair allocation of budget to promote UIL in relation to other activities					
15.2.	There is a better platform for UIL (clear structure, policy, etc.)at the national level					
15.3.	Better university infrastructure is in place to promote the linkage					
15.4.	Our university plan considers UIL one of its top priority agenda					
15.5.	The nearby industries are willing to actively work with the industries on research and technology transfer activities					
15.6.	There isa clear promotion strategies through tax deduction etc.					
15.7.	There is adequate and clear incentive structure for innovations, patent rights					
15.8.	Regular training is given to promote UIL (by Universities, government and industries)					

15.9.	The leaders at different levels are committed to promoting UIL					
	Others (if any)					

PARTVII-STRATEGIES TO PROMOTE UIL

16. The following issues can be taken as the **Strategies to promote university-industry linkage.** Please, rate their relevance in relation to your contexts to solve the problems of university-industry linkage. The weighted value for Highly relevant=5 Relevant =4 Neutral= 3 Somewhat relevant= 2 Not relevant at all =1

NO	**ITEM**	**Rating**				
		5	**4**	**3**	**2**	**1**
16.1.	Support UIL with legal framework at different levels- both at university and industry					
16.2.	Designing curriculum in relation to UIL					
16.3.	Encouraging industries participating in UIL through tax deduction					
16.4.	Arranging conditions for joint recruitment of research professors					
16.5.	Participating industries representatives as university board members					
16.6.	Building common research centres that promote UIL					
16.7.	Provision of adequate funding for university-industry linkage					
16.8.	Encourage staff exchange programmes					
16.9.	Increase the availability of laboratories, research centres etc. for UIL					
16.10.	Increasing practical engagement of students in the industry					
16.11.	Arrange different training programmes both by the university and the industry					
16.12.	Publicise and acknowledge good UIL programmes in national forums					
16.13.	Motivate and award better performing academicians and industry managers who are promoting UIL					
16.14.	Others (if any)					

17. Please, will you add some general comments on how to increase university-industry linkage in government universities of Ethiopia?

_____

_____

Thank you for your time and genuine participation!!

APPENDIX- [F]: QUESTIONNAIRE FOR UNIVERSITY INSTRUCTORS

UNISA | college of education

QUESTIONNAIRE TO BE FILLED BY UNIVERSITY ACADEMIC STAFF

Dear respondent;

This questionnaire forms part of my doctoral research entitled: **<Managing University-industry Linkage in the Government Universities of Ethiopia: Challenges and Opportunities>**for the degree of Doctor of Education (DEd) at the University of South Africa. You have been selected by simple randomsampling strategy from the population of 2,487. Hence, I kindly, invite you to take part in this survey.

The aim of this study is to investigate how university-industry linkage is managed in government universities of Ethiopia. The findings of the study will benefit universities, industries and the government by suggesting some feasible strategies for strengthening university-industry linkage.

You are kindly requested to complete this survey questionnaire, comprising three major sections as honestly and frankly as possible and according to your personal views and experiences. No foreseeable risks are associated with the completion of the questionnaire, which is only used for research purposes. The questionnaire will take approximately 25-30 minutes to complete.

You are not required to indicate your name or organisation, and your anonymity will be ensured; however, an indication of your age, gender, occupation position, etcetera, will contribute to a more comprehensive analysis. Your participation in this survey is voluntary, and you have the right to omit any question if so desired, or to withdraw from answering this survey without penalty at any stage. After the completion of the study, an electronic summary of the findings of the research will be made available to you on request.

Permission to undertake this survey has been granted by Research and dissemination office of Dilla University, Ministry of Education and the Ethics Committee of the College of Education, UNISA. If you have any research-related enquiries, they can be addressed directly to me or my supervisor. My contact details are: Misganu Legesse Bareke e-mail: misganul@yahoo.com and my supervisor can be reached at Professor GM Steyn, steyngm1@unisa.ac.za (e-mail); +27 12 664 4256(h);+2782 886 7468(c) or+27 86 642 1645(f).

By completing the questionnaire, you imply that you have agreed to participate in this research.

GENERAL DIRECTION:

- **Put "√" mark in front of your choice where you think it is more relevant;**
- **Write your answers on the blank spaces provided for the open-ended questions with clear handwriting as much as possible;**
- **There is no right or wrong answer for the questions and feel free to respond to the items indicated as per your contexts.**

PART- I. GENERAL INFORMATION

18. Your university_____
19. College/faculty/school/institute_____
20. Department_____
21. Gender: Male ☐ Female ☐
22. Age: 20-25 ☐ 31-35 ☐ 41-45 ☐ 51 and above ☐
    26-30 ☐ 36 -40 ☐ 46-50 ☐
23. Educational qualification
    Diploma ☐ MD/PhD ☐
    BA/ BSc ☐
    MA/) MSc ☐ Others (Specify ☐
24. Academic Rank
    Graduate Assistant ☐ Assistant Professor ☐
    Assistant Lecturer ☐ Associate Professor ☐
    Lecturer ☐ Professor ☐
    MD speciality others (Please specify)---------- ☐
25. Area of specialisation _____
26. Year/s of service at the university_____

PART-II- LEVEL OF MANAGEMENT OF UNIVERSITY-INDUSTRY LINKAGE (UIL)

Managing university-industry linkage can be seen from planning, organising, staffing and decision making perspectives. Please rate the level of practice of each of the items as per your university. 5= Very High, 4= High, 3= Average, 2= Low, 1=Very low

NO	ITEM	Rating				
		5	4	3	2	1
1	**Planning Sub-theme: The extent to which your university**					
1.1	Participates industries on the planning of UIL					
1.2	Assesses the existing situation on UIL jointly with industries					
1.3	Sets common directions(vision, mission, etc.) with industries					
1.4	Sets priorities with industries in strengthening linkages					
1.5	Implements UIL plans with industries					
1.6	Monitor the activities of UIL with the industries					
1.7	Evaluates the activities of UIL jointly					
1.8	Develops curriculum collaboratively with industries					
1.9	Revise the implemented curriculum jointly with the industries					
	Others (if any)					
2	**Sub-item: organising** **The extent to which your university:**	**5**	**4**	**3**	**2**	**1**
2.1	Organises resources for technology transfer with industries					
2.2	Establishes research and innovation centres with industries					
2.3	Develops infrastructure (ICT, Offices, etc.) for UIL with industries					
2.4	Establishes different technology incubation centres jointly					
2.5	Allocates financial resources for UIL activities adequately					
2.6	Others (if any)	**5**	**4**	**3**	**2**	**1**
3	**Sub-theme: Staffing** **The extent to which your university:**					
3.1	Jointly fulfils manpower required for UIL					
3.2	Exchanges experiences through training with industries					
3.3	Exchanges manpower through consultancy services					
3.4	Recruitments of individuals jointly with industries					
3.5	Assesses the quality of graduates with industries					
	Others (if any)					

4	**Sub-theme: Decision Making** **The level at which your university:**	**5**	**4**	**3**	**2**	**1**
4.1	Sets common agenda for decision on UIL with industries					
4.2	Participates industries actively on decision making					
4.3	Considers range of options for decision making on UIL					
4.4	Chooses from range of options based on their advantages and disadvantages					
4.5	Participate industries on implementing decision on UIL					
4.6	Makes decision on joint research projects					
4.7	Makes decisions on establishing common research centres					
4.8	Makes decision on setting priorities in areas of technology transfer with industries					
4.9	Others (if any)					

27. Do your department/ college have linkage with any industries?

Yes ☐ **No** ☐ **I do not know** ☐

PART-III-AREAS OF UNIVERSITY-INDUSTRY LINKAGE

28. If your response for question No. 10 above is "yes", in **which areas does your university have better linkage?** State your level of agreement. The weighted value for Strongly Agree =5; Agree =4; Undecided =3; Disagree = 2; and Strongly disagree=1

NO	**ITEM** **My university has strong linkage with industries in:**	**Rating**				
		5	**4**	**3**	**2**	**1**
28.1.	Research and academic support areas					
28.2.	Leadership and management areas					
28.3.	Curriculum development					
28.4.	Joint research projects					
28.5.	Sponsoring research works					
28.6.	Establishment of common technology centres					
28.7.	Student placements/ Apprenticeship					
28.8.	Provision of joint training programmes					
28.9.	Direct employment opportunities for graduates					
28.10.	Providing consultancy services					
	Other (if any)					

29. If you believe that there is a linkage between the two, whom do you think that more benefited from the linkages?

University ☐ Industry ☐ Both ☐

PARTIV-BENEFITS OF UNIVERSITY-INDUSTRY LINKAGE

30. If your response to the above question is either of them or both, please, in which areas does your university **have actually benefitted more**? State your level of agreement. The weighted value for Strongly Agree =5 agree =4 Undecided =3 Disagree =2Strongly disagree=1

NO	ITEM	Rating				
	My university benefited from industries more in:	**5**	**4**	**3**	**2**	**1**
30.1.	Providing funds for research works					
30.2.	Leadership and management training					
30.3.	Curriculum development and revision					
30.4.	Development of joint research projects					
30.5.	Establishment of common technology centres					
30.6.	Student placements/ Apprenticeship					
30.7.	Provision of joint training programmes					
30.8.	Direct employment opportunities for graduates					
30.9.	Receiving funds as the result of consultancy services					
30.10.	Identifying specific areas of their training need					
	Other (if any)					

PART-V- CHALLENGES OF UIL IN ETHIOPIAN GOVERNMENT UNIVERSITIES

31. The following items **state challenges that can hinder the positive outcomes of UIL**. Please rate the impacts of each of the items as per your university. The weighted value for Very High =5; High= 4; Average =3; Low =2; and Very low =1

NO	ITEM	Rating				
		5	**4**	**3**	**2**	**1**
31.1.	Low understanding about UIL					
31.2.	Lack of adequate funding for the linkages					
31.3.	Unwillingness of the local industries					
31.4.	Work overloads of university instructors (Administrative and teaching workloads)					
31.5.	Lack of well-organised infrastructure (transport, ICT etc.)					

31.6.	Lack of supportive leadership from both the industry and the university					
31.7.	Absence of clear guidelines/policies on UIL at national level					
31.8.	Lack of capacity on the parts of university professors					
31.9.	Absence of internal UIL policy at university level					
31.10.	Lack of institutional strategy at university level					
31.11.	Problem related to intellectual property rights					
31.12.	Absence of clear structure that links with industries					
31.13.	Cultural difference between academia and industries					
31.14.	Geographical location of universities and industries					
31.15.	Lack of autonomy to work with the industries					
31.16.	Lack of adequate information on market gaps for innovation					
31.17.	Poor communication between university and industries					
	Others (if any)					

PART-VI-OPPORTUNITIES FOR UNIVERSITY-INDUSTRY LINKAGES

32. The following issues can be taken as the opportunities in strengthening university-industry linkage. Please, state your level of agreement in relation to the items indicated. The weighted value for 5= Strongly Agree 4= agree 3= Undecided 2= Disagree 1= Strongly disagree

NO	ITEM	Rating				
		5	4	3	2	1
32.1.	There is fair allocation of budget to promote UIL in relation to other activities					
32.2.	There is a better platform for UIL (clear structure, policy, etc.) at the national level					
32.3.	Better university infrastructure is in place to promote the linkage					
32.4.	Our university plan considers UIL one of its top priority agenda					
32.5.	The nearby industries are willing to actively work with the industries on research and technology transfer activities					
32.6.	There is a clear promotion strategies through tax deduction etc.					

32.7.	There is adequate and clear incentive structure for innovations, patent rights					
32.8.	Regular training is given to promote UIL (by Universities, government and industries)					
32.9.	The leaders at different levels are committed to promoting UIL					
	Others (if any)					

PARTVII-STRATEGIES TO PROMOTE UIL

33. The following issues can be taken as the **Strategies to promote university-industry linkage.** Please, rate their relevance in relation to your contexts to solve the problems of university-industry linkage. The weighted value for Highly relevant=5 Relevant =4 Neutral= 3 Somewhat relevant= 2 Not relevant at all =1

NO	ITEM	Rating				
		5	4	3	2	1
33.1.	Support UIL with legal framework at different levels- both at university and industry					
33.2.	Designing curriculum in relation to UIL					
33.3.	Encouraging industries participating in UIL through a tax deduction					
33.4.	Arranging conditions for joint recruitment of research professors					
33.5.	Participating industries representatives as university board members					
33.6.	Building common research centres that promote UIL					
33.7.	Provision of adequate funding for university-industry linkage					
33.8.	Encourage staff exchange programmes					
33.9.	Increase the availability of laboratories, research centres etc. for UIL					
33.10.	Increasing practical engagement of students in the industry					
33.11.	Arrange different training programmes both by the university and the industry					
33.12.	Publicise and acknowledge good UIL programmes in national forums					

33.13.	Motivate and award better performing academicians and industry managers who are promoting UIL					
33.14.	Others (if any)					

34. Please, will you add some general comments on how to increase university-industry linkage in government universities of Ethiopia?

_____

_____

_____

_____

_____

Thank you for your time and genuine participation!!

APPENDIX-[G]: QUESTIONNAIRE FOR PROSPECTIVE GRADUATES

UNISA college of education

QUESTIONNAIRE TO BE FILLED BY PROSPECTIVE GRADUATE STUDENTS

Dear respondent;

This questionnaire forms part of my doctoral research entitled: **<Managing University-industry Linkage in the Government Universities of Ethiopia: Challenges and Opportunities>**for the degree of Doctor of Education (DEd) at the University of South Africa. You have been selected by simple randomsampling strategy from the population of 8,734. Hence, I kindly, invite you to take part in this survey.

The aim of this study is to investigate how university-industry linkage is managed in government universities of Ethiopia. The findings of the study will benefit universities, industries and the government by suggesting some feasible strategies for strengthening university-industry linkage.

You are kindly requested to complete this survey questionnaire, comprising three major sections as honestly and frankly as possible and according to your personal views and experiences. No foreseeable risks are associated with the completion of the questionnaire, which is only used for research purposes. The questionnaire will take approximately 25-30 minutes to complete.

You are not required to indicate your name or organisation, and your anonymity will be ensured; however, an indication of your age, gender, occupation position, etcetera, will contribute to a more comprehensive analysis. Your participation in this survey is voluntary, and you have the right to omit any question if so desired, or to withdraw from answering this survey without penalty at any stage. After the completion of the study, an electronic summary of the findings of the research will be made available to you on request.

Permission to undertake this survey has been granted by Research and dissemination office of Dilla University, Ministry of Education and the Ethics Committee of the College of Education, UNISA. If you have any research-related enquiries, they can be addressed directly to me or my supervisor. My contact details are: Misganu Legesse Bareke e-mail: misganul@yahoo.com and my supervisor can be reached at Professor GM Steyn, steyngm1@unisa.ac.za (e-mail); +27 12 664 4256(h);+2782 886 7468(c) or+27 86 642 1645(f).

By completing the questionnaire, you imply that you have agreed to participate in this research.

GENERAL DIRECTION:

- **Put "√" mark in front of your choice where you think it is more relevant**
- **Write your answers on the blank spaces provided for the open-ended questions with clear handwriting as much as possible**
- **There is no right or wrong answer for the questions, and feel free to respond to the items indicated as per your contexts.**

PART- I. GENERAL INFORMATION

1. Name of your university_____
2. College/faculty/school/institute_____
3. Department_____
4. Gender: Male ☐ Female ☐
5. Age: Less than 20 ☐ 20-25 ☐ 26-30 ☐ 31-35 ☐ 36 and above ☐
6. Year level in the University:

   I Year ☐ III Year ☐

   II Year ☐ IV Year ☐

   V Year ☐

PART-II- Level of management of university-industry linkage (UIL)

7. Does your university have relation with the industries?

   Yes ☐ No ☐ I do not know ☐

8. If the response for the above question is 'yes', rate the following items as per your university. The rating ranges from Very high to Very low.

   5= Very high 4= High 3= Average 2= Low 1= Very Low

NO	ITEM	Rating				
		5	4	3	2	1
1	**The extent to which the university/ Industry:**					
1.1	Involves stakeholders from the industry during the curriculum development					
1.2	Offers relevant courses to the demands of the industry					
1.3	Creates joint research projects with the nearby industry					
1.4	Arrange experience sharing forums with the industry					
1.5	launch wonderful opportunity for students to exercise practical works in the industry					
1.6	Offers employment opportunities for university graduates because of strong linkage					
1.7	Provides financial support to strengthen project works in the university					

1.8	agree to share resources with the industry					
1.9	make use of the research and innovation outputs of the university					
1.10	arranged smooth technology transfer with the industries					
1.11.	establish common research centres with the industries					
1.12.	leaders commonly set their priorities in increasing linkage with the industries					
1.13.	Invites men from industries in different training programmes					
1.14	establish joint programme evaluation with the industries					
1.15	Arrange opportunities for university instructors to do research in the industries					
1.16	arrange award and certification programmes with active industries					
	Others if any					
	Others if any					

PART-III-AREAS OF UNIVERSITY-INDUSTRY LINKAGE

9. If your response to question No. 7 above is "yes" again, in **which areas does your university have better linkage?** State your level of agreement. The weighted value for Strongly Agree =5; Agree =4; Undecided =3; Disagree =2; and Strongly disagree=1

NO	**ITEM**	**Rating**				
	My university has strong linkage with industries in:	**5**	**4**	**3**	**2**	**1**
9.1.	Research and academic support areas					
9.2.	Leadership and management areas					
9.3.	Curriculum development					
9.4.	Joint research projects					
9.5.	Sponsoring research works					
9.6.	Establishment of common technology centres					
9.7.	Student placements/ Apprenticeship					
9.8.	Provision of joint training programmes					
9.9.	Direct employment opportunities for graduates					
9.10.	Providing consultancy services					
	Other (if any)					

10. If you believe that there is a linkage between the two, whom do you think that more benefited from the linkages?

University ☐ Industry ☐ Both ☐

PART-IV-BENEFITS OF UNIVERSITY-INDUSTRY LINKAGE

11. If your response to the above question is either of them or both, please, in which areas does your university **have actually benefitted more**? State your level of agreement. The weighted value for 5= Strongly Agree 4= agree 3= Undecided 2= Disagree 1= Strongly disagree

NO	ITEM	Rating				
	My university benefited from industries more in/ by:	**5**	**4**	**3**	**2**	**1**
11.1.	Receiving funds for research works					
11.2.	Leadership and management training					
11.3.	Curriculum development and revision					
11.4.	Development of joint research projects					
11.5.	Establishment of common technology centres					
11.6.	Student placements/ Apprenticeship					
11.7.	Provision of joint training programmes					
11.8.	Direct employment opportunities for graduates					
11.9.	Consultancy services					
11.10.	Identifying specific areas of their training need					
	Other (if any)					

PART-V- CHALLENGES OF UIL IN ETHIOPIAN GOVERNMENT UNIVERSITIES

12. The following items state challenges that can hinder the positive outcomes of UIL. Please rate the impacts of each of the items as per your university. The weighted value for Very High =5; High= 4; Average =3; Low =2; and Very low =1

NO	ITEM	Rating				
		5	**4**	**3**	**2**	**1**
12.1.	Low understanding about UIL					
12.2.	Lack of adequate funding for the linkages					
12.3.	Unwillingness of the local industries					
12.4.	Work overloads of university instructors (Administrative and teaching workloads)					
12.5.	Lack of well-organised infrastructure (transport, ICT etc.)					
12.6.	Lack of supportive leadership from both the industry and the university					
12.7.	Absence of clear guidelines/policies on UIL at the national level					
12.8.	Lack of capacity on the parts of university professors					

12.9.	Absence of internal UIL policy at university level					
12.10.	Lack of institutional strategy at university level					
12.11.	Problem related to intellectual property rights					
12.12.	Absence of clear structure that links with industries					
12.13.	Cultural difference between academia and industries					
12.14.	Geographical location of universities and industries					
12.15.	Lack of autonomy to work with the industries					
12.16.	Lack of adequate information on market gaps for innovation					
12.17.	Poor communication between university and industries					
	Others (if any)					

PART-VI-OPPORTUNITIES FOR UNIVERSITY-INDUSTRY LINKAGES

13. The following issues can be taken as the opportunities in strengthening university-industry linkage. Please, state your level of agreement in relation to the items indicated. The weighted value for Strongly Agree = 5agree= 4 Undecided = 3 Disagree = 2 Strongly disagree =1

NO	ITEM	Rating				
		5	4	3	2	1
13.1.	There is fair allocation of budget to promote UIL in relation to other activities					
13.2.	There is a better platform for UIL (clear structure, policy, etc.) at the national level					
13.3.	Better university infrastructure is in place to promote the linkage					
13.4.	Our university plan considers UIL one of its top priority agenda					
13.5.	The nearby industries are willing to actively work with the industries on research and technology transfer activities					
13.6.	There is aclear promotion strategies through tax deduction etc.					
13.7.	There is adequate and clear incentive structure for innovations, patent rights					
13.8.	Regular training is given to promote UIL (by Universities, government and industries)					

13.9.	The leaders at different levels are committed to promoting UIL					
	Others (if any)					

PARTVII-STRATEGIES TO PROMOTE UIL

14. The following issues can be taken as the **Strategies to promote university-industry linkage.** Please, rate their relevance in relation to your contexts to solve the problems of university-industry linkage. The weighted value for Highly relevant=5 Relevant =4 Neutral=3 Somewhat relevant=2 Not relevant at all =1

NO	**ITEM**	**Rating**				
		5	**4**	**3**	**2**	**1**
14.1.	Support UIL with legal framework at different levels- both at university and industry					
14.2.	Designing curriculum in relation to UIL					
14.3.	Encouraging industries participating in UIL through a tax deduction					
14.4.	Arranging conditions for joint recruitment of research professors					
14.5.	Participating industries representatives as university board members					
14.6.	Building common research centres that promote UIL					
14.7.	Provision of adequate funding for university-industry linkage					
14.8.	Encourage staff exchange programmes					
14.9.	Increase the availability of laboratories, research centres etc. for UIL					
14.10.	Increasing practical engagement of students in the industry					
14.11.	Arrange different training programmes both by the university and the industry					
14.12.	Publicise and acknowledge good UIL programmes in national forums					
14.13.	Motivate and award better performing academicians and industry managers who are promoting UIL					
14.14.	Others (if any)					

15. Please, will you add some general comments on how to increase university-industry linkage in government universities of Ethiopia?

_____

_____

_____

_____

Thank you for your time and genuine participation!!

APPENDIX [H]:SEMI-STRUCTURED INTERVIEW GUIDE FOR UIL OFFICES

1. How do you evaluate the level of management of university-industry linkage as per your organisation in relation to planning, organising, staffing and decision-making?
    - 1.1. How does negotiation take place between the university and industry on UIL?
    - 1.2. How does the impact of university-industry linkage evaluate?
    - 1.3. How do you see the allocation of budget to university-industry linkage in relation to other university activities?
    - 1.4. How do you evaluate the vision and competence of leadership in creating and strengthening university-industry linkage?
    - 1.5. How does your organisation manage issues related to intellectual property rights and innovation?
    - 1.6. How does technology transfer carried out between the universities and industries?
    - 1.7. Who took the initiative in creating university-industry linkage? The university or the industry? How?
2. What are the major areas of university-industry linkage?
    - 2.1. Resource share
    - 2.2. Joint research projects
    - 2.3. Technology incubation centres
    - 2.4. Research centres etc.
3. What benefits are accrued from university-industry linkage both at the national and local level?
4. What opportunities are in place to strengthen university-industry linkages in government universities of Ethiopia in terms of infrastructure (ICT, technology incubation centres, lab centres etc.)?
5. What are the challenges that hinder university-industry linkage in your context?
6. What promotion strategies should be used to strengthen university-industry linkage in Ethiopia?

APPENDIX-[I]: INTERVIEW GUIDE TO INDUSTRY/ORGANISATION OFFICERS

1. How do you evaluate the relation of your industry/organisation with the government universities found in the country? Will you explain in terms of joint planning, organising of resources, staffing and decision-making activities?
2. In which areas do you have better links with the universities?
3. What benefits were obtained so far as the result of the linkage? Will you explain from the point of universities and your industry/ organisation?
4. What are the challenges that hinder promotion of UIL as per your organisation? Will you explain from the perspectives of the government, university and your industry/organisation?
5. What opportunities are there to promote UIL in current contexts of Ethiopia? Explain from the point of view of the government, industries, and universities?
6. How do you think that the linkage between the two can better be improved in the future?

APPENDIX [J]: INTERVIEW GUIDE TO DIRECTORS OF MoST

1. What is the level of management of UIL in Government Universities of Ethiopia in terms of joint planning, organising, staffing, decision making? Do they have joint forums?
2. How do you evaluate in terms of resource allocation to UIL? The availability of clear organisational structure? Leadership commitment? Management of IP?
3. In which areas do universities and industries in our country have a better link? How much do you think that the linkage is strong? Why?
4. What benefits have been obtained so far as the result of the linkage? Can you explain this in terms of universities and the industries?
5. What challenges are hindering the strengthening of UIL in government universities of Ethiopia? Will you explain from the perspectives of the government, universities and the industries?
6. What opportunities are there to strengthen UIL in the current Ethiopian contexts? Can you explain again from the perspectives of the government, universities and the industries?
7. How do you evaluate the capacities of MoST in guiding, supporting, monitoring and evaluation of UIL in government universities of Ethiopia?
8. How can be the practice of management of UIL better improved in government universities of Ethiopia?

APPENDIX- [K]: INTERVIEW GUIDE TO DIRECTOR'S OF MoE

1. What is the level of management of UIL in Government Universities of Ethiopia in terms of joint planning, organising, staffing, decision making? Do they have joint forums?
2. How do you evaluate in terms of resource allocation to UIL? The availability of clear organisational structure? Leadership commitment? Management of IP?
3. In which areas do universities and industries in our country have a better link? How much do you think that the linkage is strong? Why?
4. What benefits have been obtained so far as the result of the linkage? Can you explain this in terms of universities and the industries?
5. What challenges are hindering the strengthening of UIL in government universities of Ethiopia? Will you explain from the perspectives of the government, universities and the industries?
6. What opportunities are there to strengthen UIL in the current Ethiopian contexts? Can you explain again from the perspectives of the government, universities and the industries?
7. How do you evaluate the capacities of MoST in guiding, supporting, monitoring and evaluation of UIL in government universities of Ethiopia?
8. How can be the practice of management of UIL better improved in government universities of Ethiopia?

APPENDIX- [L]: FOCUS GROUP DISCUSSION GUIDE FOR UNIVERSITY ALUMNI

1. How do you evaluate the relevance of training you took in the universities in relation to the organisation you are working in?
2. How do you evaluate the management of university-industry linkage as per your organisation?
3. What are the major areas of university-industry linkage?
4. What benefits are accrued from university-industry linkage both at the national and local level?
5. How do you see the existence of a fertile ground for university-industry linkages in terms of infrastructure (ICT, technology incubation centres, lab centres etc.)?
6. What are the challenges that hinder university-industry linkage in your context?
7. What promotion strategies should be used to strengthen university-industry linkage in government universities of Ethiopia?

APPENDIX-[M]$_1$-A LETTER REQUESTING UIL OFFICE HEADS IN AN INDIVIDUAL INTERVIEW

Sep. 18, 2016

Dear prospective respondent

This letter is an invitation to consider participating in a study I, MisganuLegesse Bareke, am conducting as part of my research as a doctoral student entitled **<Managing university-industry linkage in the government universities of Ethiopia: Challenges and opportunities>** at the University of South Africa. Permission for the study has been given by Institute of Education and Behavioral sciences of Dilla University and the Ethics Committee of the College of Education, UNISA. I have purposefully identified you as a possible participant because of your valuable experience and expertise related to my research topic.

I would like to provide you with more information about this project, and what your involvement would entail if you should agree to take part. The importance of **<Managing university-industry linkage in the government universities of Ethiopia: Challenges and opportunities>** in education is substantial and well documented. The finding of this study will help universities, the government and industries to strengthen their interaction to bring about real change in the development of a nation. In this interview, I would like to have your views and opinions on this topic. This information can be used to improve the performance university-industry linkages in government universities of Ethiopia.

Your participation in this study is voluntary. It will involve an interview of approximately *90* minutes in length to take place in a mutually agreed upon location at a time convenient to you. You may decline to answer any of the interview questions if you so wish. Furthermore, you may decide to withdraw from this study at any time without any negative consequences.

With your kind permission, the interview will be audio-recorded to facilitate the collection of accurate information and later transcribed for analysis. Shortly after the transcription has been completed, I will send you a copy of the transcript to give you an opportunity to confirm the accuracy of our conversation and to add or to clarify any points. All information you provide is considered completely confidential. Your name will not appear in any publication resulting from this study,and any identifying information will be omitted from the report. However, with your permission, anonymous quotations may be used. Data collected during this study will be retained on a password protected computer for **5 years** in my locked office. There are no known or anticipated risks to you as a participant in this study.

If you have any questions regarding this study or would like additional information to assist you in reaching a decision about participation, please contact me at +251 911944488 or by e-mail at: misganul@yahoo.com.

I look forward to speaking with you very much and thank you in advance for your assistance in this project. If you accept my invitation to participate, I will request you to sign the consent form, which follows on the next page.

Yours sincerely

_____

APPENDIX–$[M]_2$- FOCUS GROUP/INTERVIEW CONSENT AND CONFIDENTIALITY AGREEMENT

I_____ grant consent that the information I share during the focus group may be used by MisganuLegesseBareke for research purposes. I am aware that the group discussions will be digitally recorded and grant consent for these recordings, provided that my privacy will be protected. I undertake not to divulge any information that is shared in the group discussions to any person outside the group in order to maintain confidentiality.

Participant's Name (Please print): _____

Participant's Signature: _____

Researcher's Name: (Please print): _____

Researcher's Signature: _____

Date: _____

APPENDIX-[N]$_1$- CONSENT FORM FOR INDIVIDUAL INTERVIEW

I have read the information presented in the information letter about the study <Managing university-industry linkage in the government universities of Ethiopia: Challenges and opportunities>in education. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and add any additional details I wanted. I am aware that I have the option of allowing my interview to be audio recorded to ensure an accurate recording of my responses. I am also aware that excerpts from the interview may be included in publications to come from this research, with the understanding that the quotations will be anonymous. I was informed that I may withdraw my consent at any time without penalty by advising the researcher. With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

Participant's Name _____

Participant Signature: _____

Researcher's Name: _____

Researcher's Signature: _____

Date: _____

APPENDIX-$[N]_2$- FOCUS GROUP INTERVIEW CONSENT TO PARTICIPATE IN THIS STUDY (Return slip)

I, _____ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions, and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

I agree to the recording ofmy own response on the individual interview.

I have received a signed copy of the informed consent agreement.

Participant's Name & Surname_____

_____

Participant's Signature Date

Researcher's Name & Surname _____

_____

Researcher's signature Date

APPENDIX-[O]: SAMPLE TRANSCRIBED INTERVIEW RESULT

- **Place of interview- Adama Science and Technology University, University-Industry linkage office**
- **Experience 22 years, Assistant professor in vehicle Engineering**
- **Responsibility- Teaching and UIL office head /associate dean**
- **Interviewee Code: UILO, #1**
- **Interviewer [I]**

[I]: Thank you for your willingness to participate in this study.

[UILO, #1]: My pleasure!

[I]: How do you evaluate the level of management of UIL as per your university in relation to planning, organising, staffing and decision-making?

[UILO, #1]:

Having a link with the industry is given as a direction by the government. As per the proclamation, our university has a link with the industry to speed-up the transformation from Agrarian to industrial society. In relation to this, our university has made several endeavours to have strong link with the industries. For example, Research Park was structured under separate unit. Research Park as one wing consists of UIL and consultancy service. Technology transfer consisting of technology transfer centres, entrepreneur development centre, sustainable energy and STEM centre. When we look this, our university is always restructuring itself to increase UIL. The management took several initiatives in this regard.

[I]: How much is the linkage?

[UILO, #1]:

From the previous information, it is clear that our university is creating relation with the industry since 2001EC and memorandum of understanding (MoU) with the nearby industries found in our vicinity at distance of 100KM radius. MoU was signed with Wonji, Metehara sugar factory, Assella malt factory, METEC, Adama Agricultural machineries. National Association of industries were invited to participate in the meeting with the universities. In fact, this was the first initiation and it did not last long. It was not this much strong. Joint planning and consultation forums are there, but lacks courage to put the plan in to practice.

Following this, the government has formed clusters of industries in to seventeen different universities. For example, Adama University was not allowed to go to the

industries found in Addis Ababa. Tannery industry, Chemical industries, sugar industries, steel industries, car assemblies around Adama and Bushoftu etc. are clusters. We have signed a memorandum of understanding with them. As per the cluster, about 25 MoU was signed.

[I]: How do you evaluate their real impacts?

[UILO, #1]:

After MoU was signed, and our university is not sitting. Several efforts were made by the university to contact with them. The university was encouraging and inspiring them especially with steel industries as their major focus is making profit. Actually, they are not willing in the areas of research and problem solving. It does not give them sense. However, they are relatively willing in taking our internees. Regarding chemical industries, which are actually government industries, they are willing to do joint research to solve their problems. We have strong link with them in this area. Joint identification of problems was made. Those identified problems were prioritised as per their need. Proposal was also prepared for one of them and waiting for funds to released. Terms of references were also completed for the rest three industries. Now they are doing proposals with teams formed from both the industry and university members. Therefore, chemical and sugar industries are doing well with us in a better way. Sugar industries have signed MoU to work with us for the coming five years. They have also identified their problems and submitted to us in a compiled form. Some of them are consultancy while the others are research. However, there is some delay is there because of reshuffling of managers.

[I]: How do you evaluate the vision and competence of the university leaders in creating and supporting such linkages?

[UILO, #1]:

Especially, our university has three vice presidents who are accountable to the president- Research and Technology Transfer v/p, v/p for Academic Affairs and vice president for Administrative Affairs. Our office is under Research and technology transfer which implies that the structure gave due emphasis to UIL. Though it is difficult to say that it is hundred percent perfect, sometimes, they go and even link with the industry beyond our cluster. For example, the vice president has created a link with OPESA and memorandum of understanding was signed with our university. This authority has seven enterprises under it and we have signed memorandum of understanding with them. This is typically because of the communication made by our

vice president. Currently, OPESA gave feasibility study to our university to establish business. Their industry planned to establish industry, which provides spare parts to the already established industries (seven already mentioned earlier). In this regard the efforts made by the leaders were very good.

[I]: How do you see the allocation of budget to UIL in relation to other university activities?

[UILO, #1]:

Just to mention some problems, to have UIL communication is very important. However, there is a serious problem in relation to transport. Despite this, there is no such pronounced problem to carry out UIL as far as the issue of budget is concerned. Using this budget, we are renting vehicles from outside which is costly.

[I]: Good, how do you manage issues related to technology transfer, Intellectual property rights and innovation?

[UILO, #1]:

Actually here, even technology transfer is at its early stage of development. Innovation is almost nil. The only thing is policies and guidelines are in place. Even though there projects done by students and instructors, they are not fully completed and transferred. However, the rules and guidelines are there theoretically. So far, there is no technology transfer and innovation and it is zero.

[I]: Who do you think that take initiative in UIL?

[UILO, #1]:

Despite some resistance from the industries, the initiative is mostly taken by our university. Irrespective of their resistance, still we are going to the industries.

[I]: Just to put in general terms, how do you evaluate the level of UIL of Adama University?

[UILO, #1]:

Instead of me, it would have been good if it was said by some other neutral body. To explain, we had some workshop last week in Bushoftu prepared by our university inviting about 50 industries and 160 staff members. Experience sharing was also carriedout by our staff members. Different roadmaps were also prepared. For instance, Cement, chemical industry and human resource development roadmaps were presented. Adama wind project was done with the collaboration of our university. They

witnessed that Adama is doing well as compared to other universities. Therefore, it can be rated at medium level, actually tending to medium.

[I]: Good, What are the major areas of linkage as per your university?

[UILO, #1]:

Okay, the major areas are resource share and training is actually there. Joint research project is also there with chemical and sugar industries. There is no common research centre for both the industries and the university. However, there is a plan to establish industry and research park by the government.

[I]: What major advantages are obtained from UIL so far?

[UILO, #1]:

There are numerous advantages. One major advantage obtained from UIL is students' internship and staff externship. We attached our students easily to the industries because we signed MoU. Our staff members were also sent to the industries for two weeks last summer. Training was also held with Wonji sugar factory for two days on Caison and BSC and the same was true with Meteorology in Addis Ababa. Our staff members got ample experiences from the visit to different industries. They wondered with what industries in the country were producing for export while there is demand within the country. Even industries do not know what is produced in the country. They do not know each other. In this case university-industry linkage can act as a catalyst in strengthening the linkages."

[I]: What opportunities are there?

[UILO, #1]:

"Currently, there are better opportunities in terms of UIL and Technology transfer. The growing number of both industries and the universities may be taken as opportunity. In fact, there are forgotten industries that the universities need to create relation with. Different institutions are there for this purpose. Various industries were clustered to universities. Metal development institute, chemical and construction institutes, and tannery institutes were established by the government. The clusters were established in relation to this."

[I]: How do you see the commitment of the government?

[UILO, #1]:

There is little motivation mechanism by the government for the industries to take part in UIL. Industries are always reluctant to work with us because they have no any

privilege/ motivation, for instance, they are accepting our students freely, though; their number is less. Actually, this is based on their willing. The government has designed the guidelines, but no push. However, because of our MoU they accept our students. If they (industries) are not willing, there is no enforcing mechanism to accept our students. Sorry to say, there are some industries that are totally ignorant of accepting our students. The interference of the government is not strong in this regard. However, through negotiation we use win-win approach to create a link with them.

[I]: What major challenges are there in linking Universities with the industries?

[UILO, #1]:

Though we have links with the industries, there are also problems. You know through link, we want to solve the problems of the industries. However, they are not willing to pay for that. Researchers need budget from the industries whereas the industries need this budget to be allocated from the university. They are not willing to pay budget for their own problems to be solved.

[I]: Other Problems? Even is there adequate understanding about UIL?

[UILO, #1]:

Emm, actually we had some workshop with them and there is adequate understanding about UIL. The major problem is in relation to allocating adequate budget for such activities. For budgeting, the suspicion is that the university academicians are not capable enough to solve the problems of the industries. They blame us for not having adequate experience. They do not have adequate trust on us. They assume that university instructors and students train on their facilities, which should be taken as opportunity. Industries consider this exposure as an opportunity for university so that they are not willing to pay additional expenses for this. On the other side, university is not willing to afford such expenses. Industries take safe position by saying, if universities have solved our problems and we are convinced with what they are doing, and then we will pay them at the end.

[I]: Do University professors have interest to work with industries?

[UILO, #1]:

Theoretically, there is exchange of manpower. Nevertheless, in practical cases there is no exchange of professors except for occasional monitoring and evaluation of internees in the industry. This may be attributed to work overload at the university, shortage of transport, lack of practical skill on the part of the instructors, unwillingness

of the industry, cultural differences with the industries, geographical distribution of the industries and lack of information on market gaps were taken as a challenge.

[I]: What strategies should be taken to solve these problems?

[UILO, #1]:

This is a very good question and also an important point. From the point of the government, several efforts were made to create good link between university and the industry. However, *absence of office, which will only focus on the UIL at the government level* is the major problem. Therefore, it is important to establish separate ministry/agency/commission known by its name, which is directly focusing on UIL. We do not know where to appeal in case of problems as we are sometimes under MoST, MoE, or MoTI. Therefore, this is not visible and I want to see this in a clear structure.

"The university should be very much open and willing to work with the industries. There are some hindrances. It should take initiative and should move, repeatedly knock at the industries so many times to create a link. Universities should be a model with high initiative. We should go to the industries tirelessly more without upsetting until we win. Our university should also scarify budget because it is returned back without being properly utilised. Moreover, it should pay sacrifice and convince instructors because they are sometimes money minded. University is actually lacking this. We have to show our potential and win their trust."

From the perspectives of the industry, feeling of belongingness has to be developed because we are twinned. Currently, industries do not feel universities as their home. They are only looking for their benefits through scholarship and training. Still, they are far away. Similarly,the university is not making proper follow up of its own students. This might be because teacher's work overload and transportation-related problems. Things are thrown to supervisors carelessly. This needs special attention.

Curriculum revision is another point of consideration. Reviewers are coming from the industries during curriculum development. However, their inputs are rarely included. Some specialities are also new totally.

[I]: Anything else?

[UILO, #1]:

Tax deduction for industries with better link is a nice strategy to promote UIL. If possible, joint recruitment and arranging conditions for staff exchange is also

important. Publicising and acknowledging good UIL is also another nice strategy. Awarding better performing university and industry managers sounds good to promote UIL.

[I]: Thank you for your precious time and genuine participation.

[UILO, #1]: Thank you!

APPENDIX- [P]: RESULTS OF PRINCIPAL COMPONENT ANALYSIS

Rotated Component Matrix[a,b]

	Component				
	1	2	3	4	5
Low understanding about UIL	.179	.102	**.775**	.046	.094
Lack of adequate funding for the linkages	.231	.085	**.806**	.052	.031
Unwillingness of the local industries	-.217	.240	**.483**	.366	-.018
Work overloads of university instructors (Administrative and teaching workloads)	.138	.094	.381	**.628**	-.136
Lack of well-organised infrastructure (transport, ICT etc.)	.189	.105	-.008	**.643**	.194
Lack of supportive leadership from both the industry and the university	.253	.264	-.129	.311	**.423**
Absence of clear guidelines/policies on UIL at national level	.124	.184	-.094	-.059	-.753
Lack of capacity on the parts of university professors	**.646**	.064	.076	.357	-.098
Absence of internal UIL policy at university level	**.815**	.101	.104	.018	.079
Lack of institutional strategy at university level	**.811**	.193	.068	-.021	.136
Problem related to intellectual property rights	**.666**	.183	.163	.185	-.006
Absence of clear structure that links with industries	.298	.334	.080	-.067	**.490**
Cultural difference between academia and industries	.034	**.505**	.110	.319	.066
Geographical location of universities and industries	.068	**.587**	.094	.258	-.018
Lack of autonomy to work with the industries	.340	**.634**	.093	.142	-.109
Lack of adequate information on market gaps for innovation	.338	**.629**	.113	.033	-.093
Poor communication between university and industries	-.007	**.700**	.050	-.273	.304

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalisation.[a,b]

a. Rotation converged in 8 iterations.

b. Only cases for which deans, Teachers, and pro.Gradua = Respondents are used in the analysis phase.