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## ETHIOPIAN HIGHER EDUCATION INSTITUTIONS' RESEARCH AND UNIVERSITY INDUSTRY LINKAGE: IN NORTHERN CLUSTER UNIVERSITIES (MEKELLE AND SAMARA) IN THE CASE OF ENGINEERING AND TECHNOLOGY COLLEGE

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**Abstract:** *The purpose of this study was to examine the status of Higher Education Institutions Research and University Industry linkage in the Northern Cluster Universities in the case of Mekelle and Samara Universities Engineering and Technology College. The study is guided by a conceptual frame work derive from the review of the literature on organizational characteristics and environmental factors that influence university – industry linkage. Moreover, a mixed method approach was used to collect and analyze data for this study. Data were collected from 100 instructors of the institutions through questioner, interview and document mining. Findings of data analysis indicated that: the status of industry –university research linkage is an infant stage. The factors which hinder the linkage between industry and universities research of Higher Education Institutions are Lack of sufficient research fund in industry, Lack of enough encouragement for researchers to undertake more applicable research , the capacity of industries to absorb and apply graduate research results is weak, Lack of mutual trust between universities and industry, Insufficient publicity, weak exchange of researchers between industry and universities, Weak dissemination of research out puts, luck of fiscal incentives for joint research and development with universities, Lack of sufficient research fund in universities, Poor orientation of the industry sector on research and development, and Inefficient bureaucracy. Whereas, The enabling factors are national policy frame work to stimulate universities - industry linkage, the Quality of academic research (research skill of academic staff) and interest of industrialist and academicians, weak implementation of policy frame that foster the link with academic research and industry in North Cluster Universities in the case of*



*Mekelle and Samara University Engineering and Technology College. Finally, recommendations for improving the current practices are suggested based on the findings.*

**Keywords:** *Academic research, University, Linkage, Industry*

## **1. INTRODUCTION**

### **1.1. Background to the research**

Academic institutions are the temples of learning. Teaching staff in higher learning institutions usually carry out their tasks in three ways teaching, research and community service. Integrated research and education helps maintain the flow of human resources from universities that contributes to an educated, trained industrial workforce. University graduates and faculty should also involve in many technology-based, start-up companies. And students trained in research are a major component of academia's contribution to industrial performance (The National Academies Press, 2003). Whereas, industries engage themselves in producing goods and services in order to satisfy varying consumer needs (Kannan, 2012).

Though these two entities (university research and industry) seem to travel on their destined paths without crossing each other's, one may understand that there is a practical need for cooperation and coordination among them. Time and again, academic institutions do require various kinds of products produced and services rendered by the industries. Similarly, industries depend on higher learning institutions for the supply of skilled manpower, providing training to them, and upgrading their skills through various forums and workshops (Kannan, 2012). Moreover, the linkage of universities and industries may be rendered with varying interpretations based on the tangible social and economic situations of the country concerned. However, the need to make use of new knowledge and research outcomes from higher education institutions in manufacturing and service enterprises is a generally accepted benefit. Making use of such knowledge and research outcomes contributes to the manufacturing and provision of new products and services or to the improvement of processes (Ministry of Science and Technology, 2013).

University-industry linkages are often conceived as a three-way interaction between universities, government, and firms as described in the Triple Helix theory (Etzkowitz, 2008). Now a day's universities are considered not only as canters of knowledge and learning, but as key institutions in national innovation systems (Nelson, 2006). In order to carry out their



role within the innovation system, universities need to be well-linked to enterprises, other research institutes, and supported by government policies. At the university level, the establishment of technology transfer departments, technology incubators, and science parks have been set up to encourage and manage entrepreneurial activities (S'chiller, 2007). However, many of African's industries are often small to medium-scale firms producing for local markets, while the relatively larger ones are subsidiaries of transnational companies which draw upon the in-house R&D capabilities of the parent company (Munyoki et al, 2011). Others note that the lack of awareness of the existing research results and new technologies by industry; the absence of strong involvement of the users in defining the research agenda; and the irrelevance of some university research as major problems in the Africa context.(Dhesi and Chadha, 1995).

Countries like Ethiopia, where the culture of indigenous, technology development and utilization is low and most industries are traditional trade based. Formal university- industry linkage has to be pursued aggressively (Dr.Mengesha Mamao, 2013). As known, the 3 Researchers should have their research projects geared towards the solution of the socio-economic problems prevailing in our country. However, as my opinion, there is very little known about the linkage between academic research and industry in Ethiopia context. Therefore, this study intends to examine the link between university research and industry in institutions of Northern Cluster (MU and SU) in the case of Engineering and Technology College. It also explores the enablers and barriers for university and industry link and the mechanisms to solve the problems regarding the link between university research and industry.

## **1.2. Statement of the Problem**

Universities play fundamental role in accelerating the scientific and technological innovation and thereby enhancing the economic vitality and competitiveness of a nation through their basic mission of generating and disseminating knowledge from teaching and research (Geiger 2006). Similarly, Industries provide quality goods and services for social consumption and making their way of living better and comfortable thus leading to community welfare, (SCHILLER, Daniel and Javier Revilla Diez. 2007). Moreover, the links between university and industry encourages the use of academic research by industries (Cohen, et al, 2002). However As my opinion the technology development and utilization is



very low and there is little known about university research and industry linkage in Ethiopian context. This implies that, the link between university research and industry is an infant. However, Higher Education Institutions has currently giving attention to such problem. Therefore, this study attempts to assess the link between university research and industry in the case of Northern Cluster Universities. This study attempts to address the following basic research questions;

- What is the status of the link between the university research and industry in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College?
- Are there policy frame works in place that govern the link between university research and industry in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College?
- What are the factors that enable or hinder the link between academic research and industry in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College?
- What can be done to strengthen the link between academic research and industry in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College?

### **1.3. Objectives of the study**

The main objective of the study is to examine the link between university research and industry in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College. More specifically, it intends to:

- examine the status of linkage between the university research and industry in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College,
- identify the factors that enable or hinder the link of university research and industry in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College,
- identify the policy frame works in place that govern the link between academic research and industry in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College, and



- forward the mechanisms to solve the existing problems of the link between academic research and industry in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College,

#### **1.4. Significance of the study**

This study is considered to be significant because University and Industry linkage is very important for one Country economic development. Moreover since our government and university leadership being deal with this problem intensively, the researcher think that it is bringing about the much needed awareness about the level of the link between academic research and industry and to provide hindering factors for weak University and Industry linkage. Furthermore, this study will be useful not only in teaching institutions as a reference material but also to trigger further research on various related issues regionally and nationally.

#### **1.5. Operational Definitions**

**Academic research** for universities is the type of research directed towards increasing knowledge in science (Sanow 1959).

**University:** For the purpose of this research, 'university' refers to the institutions which impart higher education in Ethiopia which disseminate knowledge in various disciplines.

**Industry:** For the purpose of this research work, 'industry' means various private manufacturing industry which producing goods.

**Linkage:** Throughout this research paper, the words 'convergence', 'interface', 'interactions', 'partnership', 'alliance', 'cooperation', 'linkage' and 'strategic relations' have been used as synonymous and taken to mean the 'coordination' between academic research institutions and industry.

## **2. REVIEW OF RELATED LITERATURE**

In its technical sense, education is the process by which society deliberately transmits its accumulated knowledge, skills and values from one generation to another. In general Education is the foundation of economic and social development. (UNESCO, V 28, NO1, 2003, P46). In this regard universities play fundamental role in accelerating the scientific and technological innovation and thereby enhancing the economic vitality and competitiveness of a nation through their basic mission of generating and disseminating knowledge from teaching and research. (Geiger, 2006). In view of this, Universities are increasingly being



called upon to contribute to economic development and competitiveness (Feller 1990). One of the indicators of a country's economic development and technological advancement is the level of growth in the industrial sectors.

### **2.1. University - Industry link**

Universities are central components of the national science and innovation. They create human capital, without which existing technology cannot be absorbed and adapted (Lau, 1996). In many of the science-based industries, key knowledge is thus created in universities and government laboratories and then transferred to business (Niosi, 2000b). Furthermore, in any type of industry, higher education increases the capacity of organizations to adopt high technology and use it efficiently (Lim, 1999).

Universities move the frontier of science forward by means of advanced research, and they transfer the results of this activity to industry and society through different channels. Among these channels are: University graduates who move into industry, Publications and presentations at academic conferences and industrial meetings, Research contracted by industry, consulting work done by university professors, exchange of staff and Scientific instruments developed in universities and then adopted and diffused by industry (Rosenberg, 1994).

Nowadays, a number of developed countries have already redefined the traditional roles of their universities to promote university-industry interaction in teaching and research (Geiger, 2006; Dill, 2006 and van vugh, 2006) According to James (2004) the main reason for enhancing university-industry linkage include the following:

- Universities provide a ready pool of graduate students that industry may access for their working requirements,
- Technical opportunities exist in industry for faculty and students that may not exist in universities,
- Materials exists in industry for research and educational purpose that may not exist in universities,
- Collaborations with industry provides research funding to universities,
- Such collaborations advance the service mission of universities,
- Collaborations provide for local and regional economic development,
- Universities often have research infrastructure that industry wants,



- Industry outstanding to universities, to reduce the costs of doing business and increases profits.

The links between university and industry encourages the use of academic research by industries (Cohen, et al, 2002). It also enables both universities and industries to maximize capitalization, knowledge spill over,( knowledge from universities to industries).

Regarding, quality research universities, High quality faculty committed to research and teaching, high quality graduates who want to learn to perform research or function with advanced expertise, an intellectual climate that encourages scholarship-an atmosphere of intellectual freed in which teaching and research can be performed effectively.

In general, to strengthen university-industry linkage, the legal adjustments have attempted to abolish the conditions of unfair competition and establish relationships between academic and private sector organizations on a clearer legal base.

## **2.2. The link between academic research and industry**

As shown above one of the channels that Link University and industry is an academic research. Conceptually “Research is a systematic investigation of some phenomenon or series of phenomena by the experimental method to discover new facts or information or to coordinate these facts as laws” (Wehmeier 2000). Research may be classified into two main spheres: academic or basic research, and applied or technical research. Basic research seeks essentially an extension of knowledge (Clover). Basic research may be defined as the human activity directed toward the advancement of knowledge, and thus may have no known immediate application, it normally requires underwriting by foundations or universities or government. Applied research is problem oriented where the results are predictable and relate only to solve a specific problem (Clover and Balsley 1974, Nelson 1959.) Academic research for universities is the type of research directed towards increasing knowledge in science (Sanow 1959).

In general, the above examples show that the link between academic research and industry is very prominent for economic development.

## **2.3. Collaboration with Industry**

Collaboration with industry is critical for academia to create scientific knowledge (International Journal of Social Inquiry Volume 4 Number 1 2011). Collaboration in type has formal and informal dimensions. In the process of formal interaction, there are four basic



forms (Butcher & Jeffrey, 2005); i) codification (e.g., scientific publications and patents); ii) cooperatives (e.g., joint enterprises and workforce exchange); iii) meetings and internet networks; iv) agreements (e.g., license agreements and collaboration contracts). Whereas, in the dimension of informal collaboration, 'social' interaction is realized at a personal level between the parties by factors such as shared work areas,

In general, Collaborative with industry may benefit academics' research activities by establishing relationships with knowledge users and mobilizing resources that complement public research funding. In addition to that, it enhances the progress of both science and technology (Rosenberg, 1982).

#### **2.4. Factors that enable or hinder University-Industry Collaborations**

The collaboration link between universities and the industry is necessary for technology transfer and the commercialization of academic research. Any technological innovation process implies close linkage among different players. The University, Industry and Government, and the intensity and nature of interaction among these actors critically influence the innovative performance of institutions/enterprise within a given Innovation system (Nelson: Lundvall and Johnson, 2009 cited in Mulu Nega, 2009). Relating to that, University and industry collaboration is an activity in which industries learn from experience and develop richer and more refined ways of engaging with the university sector (Johan Bruneela, b and Ammon Saltera, 2009).

The differences between universities and industry, such as aims, culture, bureaucratic structure, and human resources profile create a variety of problems that will be encountered in the implementation of joint projects (Butcher & Jeffrey, 2005; Philbin, 2008; Arvanitis, Kubli & Woerter, 2008). Despite the diversity of areas of collaboration, there are many reasons why university-industry projects cannot be realized. Therefore, the process remains under the influence of several external and internal factors. At this stage of the review, details are given about factors affecting the collaboration process in a negative or positive way.

#### **2.5. Ethiopia's Industrial Development Strategy**

Ethiopia's development goals are laid down in the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) and its industrialization goals are set out in the Industrial Development Strategy. PASDEP is the country's second poverty reduction strategy





paper, drafted for the five-year period 2005/06-2009/10. It has a much more explicit focus on private sector development, competitiveness, and growth than its predecessor. The Industrial Development Strategy, which was approved in 2002, is regarded as the country's first-ever comprehensive industrial development strategy.

Overall, the plan reflects a quite clear strategic orientation and the government's strong commitment to industrial development and structural change. It is more explicit than the respective plans of many other countries, which typically provide standard lists of desirable goals, without offering much practical guidance for policymakers.

Despite university-industry interactions bring enormous benefits to both parties, establishing them is often challenging. The factors which may hinder university-industry interactions have been studied by many authors. For example, An empirical study by Kaymaz and Eryiğit (2011) identified the factors that might have been considered as barriers to university-industry collaboration from an academicians' perspective in Turkey.

However, regarding hindering factors, according to the Consolidated and Classified MU,SU Strategic Planning Issues reports in 2006, some of the shortages are lack of effective linkage with industry, lack of incentives for research, Inadequate solicitation of research fund, Inadequate dissemination of research results and etc.

### **3. RESEARCH DESIGN AND METHODOLOGY**

The chapter describes the type of research design, the data collection methods. It also discusses issues such as study area, study design, study subject, type of analysis and issues relating to the validity and reliability of the research and its findings.

#### **3.1. Study design**

The study employs a mixed method approach to assess the university research and industry linkage in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College. The reason for using of quantitative and qualitative approach in combination is to provide a better understanding of research problem than other approach that stand alone. Mixed research method is important to offset the weakness of both qualitative and quantitative research methods (Creswell, 2007).

The justification for the quantitative approach is to quantify the data on the issue under study and to provide statistical information about problem (Creswell, 2009). The



quantitative research design is cross-sectional design, because the data that gathered through questionnaire were collected once and it is significant to study.

The reason to use qualitative approach is the best way to access the participants' ideas, memories and attitude in their own words rather than the words of the researcher (Cohen, 1994).

### **3.2. Study Subject**

Technology transfer and industry linkage, university industry linkage unit director, research, and development vice head of the corporation were subject of the study. Moreover, key informants such as instructors, department heads, were subject of the study. Furthermore guidelines documents, working papers, related policies and other related documents were analyzed as a secondary source.

### **3.3. Sampling and Sampling Techniques**

The researcher used stratified and purposive sampling techniques to select participants of the study. The reason to use stratified sampling technique is in order to ensure the representation of respondents from selected University, college and department. Moreover, departments are not homogeneous which require to be stratified. In order to do so, the researcher tried to include sample respondents from each department through lottery method after stratifying them in department. Purposive sampling was employed to select interviewee. The researcher clearly expressed the objective of the study and all of the participants were informed consents who were volunteered to participate in the study.

### **3.4. Sample Size**

From the selected schools in Engineering and Technology College, civil Engineering, Electrical and computer science Engineering, Mechanical Engineering, and Chemical Engineering and Food processing, research and development department vice head of METEC, university industry linkage unit director, and Institute of Technology for research, key informants, and instructors in selected departments. 35 percent of the total population was sample size for this study.

### **3.5. Sampling and Sampling Techniques**

This section is a summary of the description of the instruments. The instruments used in this study include questionnaires, interviews and document analysis; they are discussed in the sections that follow.



### **3.5.1. The questionnaire**

Questionnaires were preferred for this study because they generate quantifiable data ready for statistical analysis (Mugenda, 2008:285). Questionnaires allow each one of the respondents to read and answer identical questions, thereby ensuring consistency of the demands. (Saunders et al., 2007: 357). They add that questionnaires also generate standardized data, which makes the processing of responses easier. Standardized data also help to increase the validity and reliability of the results (Panneerselvam, 2008: 93).

The questionnaire was developed in order to collect the necessary data on the moderator variables, which consisted of four parts, first part the profile of the respondents, second analyzing the existence and levels of industry- academic research linkage, third identifying the challenges involved and measures to overcome them. In order to facilitate comfortable data collection as well as detailed information gathering, questions will be designed with a combination of close-ended and open ended questions. In line with the objective of the study were developed and distribute to the sample respondents to generate a primary data. The researcher distributed the questionnaire to the 125 respondents and 100 of the respondents filled the questionnaire and returned.

### **3.5.2. Semi-Structured Interviews**

The essence of the qualitative interview is to capture the perspectives of the respondents through verbal interaction between the interviewer and the interviewee (Mugenda & Mugenda, 2003: 90; Saunders et al., 2007: 394). Panneerselvam (2008: 18) points out that when planning an interview schedule, the researcher has to decide which questions to ask. Monyatsi (2002: 172) notes that a major advantage of the interview is its adaptability, where a skilful interviewer can follow up ideas, probe responses and investigate motives and feelings that a questionnaire cannot do. Mugenda and Mugenda (2003:91) add that in semi-structured interviews, some interview questions are asked together with open-ended ones in the questionnaire.

In the current study, the responses were recorded as notes when the respondents talked; in an attempt to avoid problems caused by note taking in the course of the interview, the interviewer used short-hand notes. However, permission was first sought from the concerned body before the notes were taken and they were assured that the recorded information would only be used for purposes of the study at hand.



### **3.5.3. Document Mining**

Under the analysis of documents, the (October 2006 Addis Ababa) National Science, Technology and Innovation (STI) Policy of Ethiopia and National Science, Technology and Innovation Policy: (October 2010 Addis Ababa).by the title of Building Competitiveness through Innovation were checked by the researcher to ascertain the rationale for the current study. Such documents included the Innovation (STI) Policy, and national and regional intellectual property right policy, the strategy to facilitate university – industry linkage the Ministry of Education (MoE) strategic plan (2006-2011), the research project paper in university – industry linkage office of which some are consultancy activities and some research project with non industrial sectors and sign of memorandum with university on September 2006 in consulting and capacity building. These documents acted as information sources and were used as a means of triangulating data collected from questionnaires and interviews and also to justify research aims.

### **3.6. Data Quality Assurance**

All data gathering instruments should be piloted to test the items validity and reliability. In pilot study of the current study, two departments in institute of technology were randomly selected from the target population. The pilot test enabled validation of the instrument by identifying possible ambiguities in both content and language in preparation for the data collection of the main sample. It also helped the researcher to form an idea of the time required to complete the questionnaire and to anticipate any problems likely to be encountered during the main data collection. After analysis of the pilot responses to the questionnaire, and interviews the instruments were reproduced for administration to the main sample using a procedure to be described in the section that follows.

### **3.7. Data Collection Procedure**

A research permit for conducting research was obtained from the Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College of educational research and development office. Before gathering the data, the purpose of the study was explained to the concerned body, namely to investigate the status of linkage between university research and industry.

The researcher requested the instructors to fill in questionnaire and conducted interviews with the selected directors and department heads separately.



### 3.8. Data Analysis and Procedure

Data analysis was done for each of the questionnaires. The detailed codification scheme was evolved, and data found on the questionnaire returned was codified according to the scheme. The coded data were fed on worksheets and because of the descriptive nature of the study, percentage and mean score have been applied. However, responses from open-ended items, those from the interviews and document analysis were analyzed qualitatively.

## 4. DATA PRESENTATION AND ANALYSIS

This chapter presents results of data analysis. The first section deals with background information of the respondents, and the second section deals with results on the status of linkage between the academic research and industry, identifying the factors that enable or hinder the link of academic research and industry, identifying the policy frame works in place that govern the link between academic research and industry and forwarding the mechanisms to solve the existing problems of the link between academic research and industry.

The questionnaire was distributed to a total of 117 respondents and 107 of the respondents completed and returned the questionnaires, which represent 91.45% response rate.

### 4.1. Background of Respondents

Variables		Respondent characteristics
Sex of respondents	M	93
	F	7
	T	100
Qualification	BA/BSC/BED	2
	MA/MSC/MED	90
	Ph.D	8
	Total	100
Academic rank	Prof.	0
	Asso.prof.	4
	Assi.Prof.	10
	Lecturer	86
	T	100
Teaching experience	5years and below	70
	6-10years	20
	11-15years	8
	16-20years	2
	21years and above	0
	Total	100



As shown in Table 4.1, the majority of the respondents (93.5%) are males. Regarding their educational status most of them (86%) are with second degree qualification and with academic rank (80.4%) are lecturers, (1.9%) assistant lecturer, (9.3% graduate assistant, assistant professor (4.7%), associate professor (2.8%) and professor (0.9%) .The teaching and research experience of the majority is 5 years and below.

#### **4.2. University – industry linkage**

Majority of the respondents (89) 83.2 % reported that the fund rising from industry is poor. Regarding, joint research collaboration b/n University and industry (93) 86.9 % perceived as poor, similarly,(92)86 %and (96)89.7 %, of respondent said that Technology and innovations transferred to industry is poor respectively. Whereas, in view of the issues on staff exchange and Participation of industries in university research,(94)87.9 % and.(93) 86.9 %rated as fair respectively. In the other side (94) 87.8% and (96) 89.7% of the participant reported that, university and industry consultation and existence of signed memorandum of agreement between university and Industry are rated as good. In general according to the response of respondent the status of the linkage between industry and MU,SU Engineering and technology College towards academic research is unsatisfactory. Because 60%of all items are highly rated as poor, 20% are also fair and 20% are good.

#### **4.3. Factors that influence the link between industry and university**

By using mean score the majors serious and negatively affecting factors for effective linkage between university research and industry in the case of institute of technology in Addis Ababa university are Lack of sufficient research fund in industry(11.11%), Lack of enough encouragement for researchers to undertake more applicable research (11.07%), the capacity of industries to absorb and apply graduate research results is weak (10.99%), Lack of mutual trust between university and industry(10.99%), Insufficient publicity 10.94%), weak exchange of researchers between industry and university (10.93%), Weak dissemination of research out puts(10.93%),Lack of fiscal incentives for joint research and development with universities (10.93%), Guidelines to assist faculty in their relations with industry (10.91%), Lack of sufficient research fund in university (10.33%), Poor orientation of the industry sector on research and development (10.30%), poor attention given to research and development in industry (10.28%),and Inefficient bureaucracy (10.26%). and also the enabling factors are national policy frame work. to stimulate university -industry linkage



(8.44%). The Quality of academic research (research skill of academic staff) (9.21%), and Lack of interest of industrialist and academicians (9.29%).

The mechanisms indicated in an open ended questioner are both university and industry should establish awareness creating meeting, reward the top researcher and regular follow up by the concerned body, strengthen enforcement power of the existing national policy which enforced the university, the industry to create strong linkage in accordance with national interest, and university, government and industry should have common strategic plan to have a frame work for the desire linkage.

## **5. SUMMARY, CONCLUSION AND RECOMMENDATION**

### **5.1. Summary of Major Findings**

The objective of this study was to assess the status of linkage between industry and university research in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College. Moreover, the mixed method of approach was used to collect and analyze the data in this descriptive research type. The data collected from research and technology transfer directors, university– industry linkage directors, and department heads in institute of technology, research and development vice head of the METEC and from key informants such as instructors, using questioners, and interview and document analysis.

The findings are discussed in the sections that follow in **Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology College.**

**5.1.1. The status of linkage between industry and university research;** In Joint publication between university and industry, Joint laboratory under taken between university and industry, number of innovations transferred to industry and Technology transfer between university and industry, the existence of Joint research collaboration b/n University and industry with regard to Academic research, and fund raising from industry for university research have poor status. Moreover, the data indicate that, the university has consultancy and capacity building linkage with the public institute than private productive sector, MU,SU research policy and others which has significant role in creating the desired linkage, but it cannot institutionalize the linkage between university research and industry in Northern Cluster Universities (Mekelle and Samara) in the case of Engineering and Technology



College. Therefore, the status of industry –university research linkage in the case of institute of technology is in an infant stage.

**5.1.2. The factors that enable or hinder the link of university research and industry;** The major factors that hinder or enable the link of university research and industry are lack of sufficient research fund in industry, weak absorptive capacity of industry ,lack of enough encouragement for researchers to undertake more applicable research, lack of mutual trust between university and industry, lack of the form of fiscal incentives for joint research and development with universities, lack of Guidelines to assist faculty in their relations with industry and poor orientation of the industry sector on research and development. Whereas, the enabling factors are:-national policy frame work to stimulate university - industry linkage, the quality of academic research (research skill of academic staff) and University research policy.

**5.1.3. The policy frame works in place that governs the link between university research and industry;** Legal policy frame to facilitate the link of university and industry is very fundamental. In line of that, there is strategy to facilitate university and industry linkage and clearly stated moreover, the university research policy is well expressed and identifies the research area. However, it is minimal level of implementation especially in university research and industry linkage.

## **5.2. Conclusions**

Based on the findings, conclusions were drawn;

Even if, One of the major responsibility of the university is conducting research and creating technology transfer mechanism, the result of this study indicate that the linkage in terms of university research with industry is in an infant stage, moreover, Creating linkage with university doesn't get priority attention by the industry owner because the industry owner did not give priority for local technology and expertise, not only this but also they are interested with profit, accordingly the university leadership focus on other routine activities and bureaucratic issues. As a result the status of the linkage between the two entities is very low.

With regard to National policy frame that facilitate the link of university research and industry. Even if, national policy frame exist to stimulate university- industry linkage. There is minimal level in implementation and University, Government and the Industry did not put





functional mechanism and institutional modality to implement the policy into practice. The additional hindering factors are lack of innovation improvement center and industries more focus on business or profit making,

### **5.3. Recommendations**

The recommendations from this study are based on the findings of the empirical data analysis and interpretation and the research conclusions. The status of linkage between institute of technology and industry in higher education institutions from research point of view shows that there is a need of regular discussions between industries and university leadership, because the status of their linkage is weak and is not supported by institutional modality. Moreover, the following recommendations are made:

- Policy-makers have put in place initiatives aimed at strengthening the linkage between industry and university. And policy-makers implement laws that provide commercialization incentives to universities by granting them ownership of intellectual property arising from their research. Furthermore make continuous follow up specifically on university and industry linkage.
- By actively engaging in technology development, universities are demonstrating ambidexterity in their ability to produce both scientific knowledge and technology outputs. University leaders should established guidelines to assist faculty in their relations with industry with respect to academic research, improve the internal facility and fulfill infrastructure for research work. And lastly, accomplished rewarding system for individual researcher according to their Contribution.
- Industry practitioner should create awareness about the importance of university and industry linkage for economic development and established a system to have a fruitful relationship with university officials, provide sufficient research fund with their problem to university, build their research absorptive capacity, Improve research infrastructure and facilities such as research units, and allocate R and D fund.
- Regarding further inquiry, since this thesis had focused on only towards academic research and industry linkage, it is possible to study in all university throughout the region or country. Moreover, in this thesis limited numbers of hindering factors are indicated. Using this result as deriving force other additional factors can be studied.



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