

University Industry Research Linkage: The Case Of Adama Science And Technology University, Ethiopia

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Abstract

Mixed methods were employed to conduct the study in order to address the issue. A sample survey of 125 individuals was conducted and interviews with the four scholars from the university and two experts from industry were carried out. Document analysis was also used to analyze policies related to university- industry linkages. This study investigates the fact that there is low university- industry linkage in terms of academic research. Besides, the power of implementation of policies in connection with university- industry linkage is very poor at the national and university levels, and the leadership commitment to creating linkages with industry doesn't get priority attention. Even though the university has no financial constraints and an annual fund for the university- industry linkage, the academic staffs were not committed enough to conduct academic research. Furthermore, the study findings indicate a lack of incentive mechanisms to motivate academic staff and updated research infrastructure and facilities. In addition, the results of the study showed that the university has no IPR policy at the university level as of today. Finally, it was recommended that universities, as key producers of research, ought to increase their participation in producing high-quality problem-solving research; industries are able to use research and local technology outputs while also supporting universities and the government also enforces the universities and the industries in order to create strong linkage among the actors (university, government and industry).

Keywords: University-industry linkage, Research, University, Industry, Higher education.

Date of Submission: 04-05-2023

Date of Acceptance: 14-05-2023

I. Introduction

Investing in higher education is a way to promote human development and economic prosperity. Many nations around the world have been investing in their higher education institutions as a result of this recognition. Due to this, getting universities to participate more in the innovation process has gained international attention. They play pivotal roles 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)

Universities are well known for producing new knowledge, innovating, and advancing technology. They are positioned as strategic assets in innovation and economic competitiveness, as well as problem solvers for socioeconomic challenges impacting their countries all over the world, from western industrialized countries to China, Brazil, and other rising economies (Ginies & Mazurelle, 2019). Governments and organizations are actively exploring methods to develop university relations with industry through research and other types of collaboration in order to fully realize the potential of universities in this area (Ginies & Mazurelle, 2019).

University-industry linkages can take many different shapes and include varied levels of engagement. Research and development (R & D), training, curriculum creation, and consulting are some of these (Michaela, 2000; Munyoki et al., 2011). Industries and other players may commission a particular piece of research, support a university chair in an area of interest, or collaborate with universities on joint R & D projects. Universities encourage technology transfer to the productive sector through prototype development, technology incubation, the creation of spin-off firms for commercialization, licensing and royalty agreements, and other related activities. Other universities concentrate on offering consulting and business services, like testing and certification (Michaela, 2000).

African universities are moving to start and speed up measures to strengthen institutional capacity to support links with industry and the larger productive sector despite criticisms of the weak state of university-industry linkages in Africa (Tiyambe, 2004). Yet, there is a lack of data to provide a comprehensive and

informed picture of what steps African higher education institutions have already taken and what is needed to provide a strengthened, more comprehensive platform for promoting, building, and managing synergistic partnerships with the productive sector (Awuor, 2013).

Apart from perhaps the Maghreb region and South Africa, most of sub-Saharan Africa lacks high-tech industries and a true technology culture that arises from the constant pressure to update and deepen technology in order to survive in a competitive marketplace (Mouton, 2015). Many of Africa's industries are often small to medium-sized firms producing for local markets, while the relatively larger ones are subsidiaries of transnational companies that draw upon the in-house R & D capabilities of the parent company. Other factors identified include lack of sufficiently qualified researchers, weak research infrastructure, inadequate funding for research and donor-influenced research priorities (Patricia, 2018). Under such conditions, the link between the supply of skills and new knowledge from higher education institutions in Africa and the demand for these from industries and other parts of the productive sectors is not clearly established (Mouton, 2018).

Besides, university-industry link in terms of academic research and innovation is not well developed in the Ethiopian context (Mulu, 2017). The author also indicates that the contribution of academic research in enhancing the country's economic development is minimal at Addis Ababa University in particular and in the country in general. The need for the current research, which seeks to investigate the actual status of Adama Science and Technology University with regard to the integration between academic research and productive sector, is a plan. Therefore, the purpose of the paper is to examine the current university industry link in terms of research taking ASTU as a case.

1. What is the status of university-industry linkages in terms of research at Adama Science and Technology University?
2. What are the factors that enable or hinder the research university-industry link at Adama Science and Technology University?
3. What strategies are in place to improve the link between university and industry (U-I) in the Ethiopian context?

II. Literature Review

Conceptual considerations of university industry linkage

Links between University and Industry

The reasons for universities to seek cooperation with industry appear to be relatively simple. Gossman, J.H. et al., (2001) have identified several reasons for this interaction: (1) Industry provides a new source of money for universities; (2) industrial money involves less "red tape" than government money;

(3) industrially sponsored research provides students with exposure to real-world research problems; (4) industrially sponsored research provides university researchers a chance to work on intellectually challenging research programs; (5) some government funds are available for applied research, based upon a joint effort between the university and industry (Peters and Herbert, 1982).

On the other hand, several main reasons, which are claimed to motivate the industry to increase university-industry links, have also been provided by (Peters and Herbert, 1982). They are:

(1) access to manpower, including well-trained graduates and knowledgeable faculty; (2) access to basic and applied research results from which new products and processes will evolve;

(3) solutions to specific problems or professional expertise, not usually found in an individual firm; (4) access to university facilities not available in the company; (5) assistance in continuing education and training; (6) obtaining prestige or enhancing the company's image; and (7) being good local citizens or fostering good community relations.

Benefits of University-Industry linkage

Benefits for universities are generally stated as follows: new funding for research; new opportunities for graduates; and new directions for research. The gains for industries are mainly based on earlier and easier access for university graduates and faculty members; research results; and intellectual property rights. All these features implicitly reflect that the university-industry interaction provides the innovation system with much more dynamism and efficiency compared to each actor working separately (Patel, 2000). However, despite this positive picture, there are problems and clashes among these actors in not only sharing the results of this cooperation but also in coming together. These conflicts and problems generally emerge due to differences in culture, contributions, and expectations (ibid).

Incentives in the University - Industry linkage

The universities often pursue basic research and laboratory work on a small scale in projects that are a long way from commercialization. The companies, on the other hand, are more interested in applied research that leads to new or improved goods and services that can subsequently be produced on a large scale. The question

is how the new knowledge produced at the universities should be made available to industry, and, not least, who has an incentive to repackage the knowledge so that it becomes attractive to industry.

Henrekson (2002) presents four ways in which researchers can receive payment and thus be given an incentive to participate in a commercialization process: research grants from companies, which usually means that the external company owns the results; consulting assignments with external companies with remuneration in the form of a salary; payment in the form of royalties in connection with licensing or part-ownership where the external company runs the commercialization process; and direct part-ownership if the researchers themselves are involved in starting a new company.

Research in University-industry Links

"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"(Patel, 2000). Within the context of this paper, research may be classified into two main spheres: academic or basic research and applied or technical research. In the following section, I will explore these two forms of research within the context of how R& D has transformed companies and their evolution. Research may be classified in two main dimensions: basic research and applied research. The goal of basic research is to expand knowledge. Basic research may be defined as human activity directed toward the advancement of knowledge and thus may have no known immediate application; it normally requires underwriting by foundations, universities, or the government. Applied research is problem-focused where the results are predictable and relate only to solving a specific problem (Clover and Balsley, 1974).

Policy issues (Environment):

Two important theoretical developments in the literature have increasingly informed innovation policy in general, and HE/industry links policy in particular. The first, broadly termed, "endogenous growth theory"(Schumpeter et al., 2006) argues that innovation and knowledge transfer from within the economic system are key drivers of economic growth. The number of knowledge workers and how much innovation is generated (measured through patenting and innovation-based start-up activity) is a determining factor in generating productivity growth among small firms, albeit in a random and unpredictable way (Mac, A., and Holt, R., 2007). The second approach, broadly termed the "Triple Helix" approach (Leydes, 2005), sees knowledge transfer as a function of a complex set of formal and informal linkages among research institutions, financial and commercial businesses, and the government (Berg-Jensen, B et al., 2007). The interaction between the three strands of the "helix" creates the unique and distinctive characteristics of an innovation system the "symbiotic tension" that reflects the simultaneous inter-dependency and competition between actors (Harding, 2000, 2001).

Intellectual property:

The protection of intellectual assets is essential to the competitiveness of most organizations, private or public, and to their attractiveness to investors. Special emphasis needs to be placed on specific issues relevant to R& D collaboration and technology transfer between public research organizations and industry, since "university-industry relations" are an increasingly important way of enhancing the impact of scientific achievements on different competitiveness factors. Moreover, industry could take the view that it paid for the research and should own the intellectual property (the patent), especially since it may be vital to their business and competitive position. However, most universities insist on owning the patents arising from their research, since only through such ownership can it (i) assure that the technology will be developed; (ii) assure that the university can retain the rights to practice under its own inventions to assure its freedom of action in the future; and (iii) maintain a consistent policy for its investigators, whether they are working on government-funded businesses or on research that has been federally-sponsored. The legislation allowed universities to license their patents to industry, exclusively or non-exclusively. Royalties received by the universities for such licensing were to be used for further research and education as well as for rewarding the inventors (Geiger, 2006).

The Ethiopian Context (National policy for research)

Research in Ethiopia should address the major challenges of the country and contribute to the achievement of national development objectives. However, there is a disconnection between the focus of the researches undertaken by industries and academic institutions and the needs of the major social and economic sectors of the country. Thus, the national research system shall concentrate mainly on adaptation of appropriate foreign technologies to meet domestic needs, with some basic research activities National Science, Technology and Innovation Policy(National Science, Technology and Innovation Policy, 2019).

Overall, Ethiopias policy framework's strength lies in its alignment with development policy.

However, it is limited by the absence of a dedicated national research strategy. Assessing the needs of the research system in Ethiopia (2019) highlighted that policy aspirations are not yet translating into effective practical interventions, and presently there is very little activity in terms of policy monitoring and enforcement at the organization level because of limited coordination at a national level.

The study employed a mixed method to assess the university- industry linkage in the case of Adama Science and Technology University (School of Applied Natural Sciences, School of Civil Engineering and Architecture, School of Electrical Engineering and Computing, and School of Mechanical, Chemical, and Materials Engineering). A mixed research method is a philosophical assumption that guides the direction of the collection and analysis of data and the mixture of qualitative and quantitative data in the research process. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than other approaches that stand alone (Creswell, 2007). The justification for the quantitative approach is to quantify the data on the issue under study and provide statistical information about the problem (Creswell, 2009). The reason to use a qualitative approach is that it is effective in obtaining information about the values, attitudes, behaviors, and social contexts of particular populations (Creswell, 2009). In addition, this approach is the best way to access the participants' ideas, memories, and attitudes in their own words rather than the words of the researcher (Cohen, 1994). To this end, convergent/parallel/concurrent design in qualitative and quantitative approaches are conducted separately yet concurrently and merged at the point of interpretation (Angell & Townsend, 2011).

Adama University was chosen for this study because it is one of the science and technology universities and expected to closely work with industries. Besides, Adama Industry Park was selected as an area of the study, because it is one of the industries in Adama city with huge projects with extensive research and capable of hosting students who are engaged in internship activities. The study's subjects were incorporated from technology transfer and community service, research and publication, and the university's industry linkage unit, as well as the Adama Industry Park's industry-university research and development experts. Moreover, other respondents, such as higher officials from university and department heads, were included in the study.

To choose study participants, the researcher employed simple random sampling technique, stratified and purposive selection approaches. To guarantee that instructors from the chosen department are represented, the stratified sampling technique was used. Instructors from different departments need to be stratified since they are not uniform. After departmentally stratifying the respondents, the researcher attempted to incorporate sample respondents by using the lottery method in each department. A purposive sampling technique was used to select study subjects as mentioned above. The researcher clearly stated the study's objective, and all participants were informed for their consents that could make them volunteer to participate in the study. Finally, simple random sampling technique was used to select 140 respondents from the total population (252) instructors. Of the 140 questionnaires distributed to the instructors, 125 were filled out and returned. Besides, the researcher used purposive sampling techniques to select an informant interviewee from university higher officials, department heads and experts and industry experts based on their relevance of university industry linkage in terms of research. The data collected from instructors were primary and was collected mainly through a survey

Table 1: Status of university industry linkage. Source: Field Work
Do you think that there is a link b/n industry and university in terms of research?

	<u>Respondents</u>	<u>Percentage</u>
Yes	48	38
No	77	62

To extract in-depth descriptive data on the university- industry linkage in terms of research at the study sites, the researcher utilized qualitative data analysis techniques such as document review and interview analysis with quantitative data analysis methods using percentages. Pertinent documents about the university-industry linkage in terms of research, policies, and practices were used to confirm the researcher's understanding of these policies and procedures and to add context to information gleaned from questionnaires and interviews. The qualitative data will be subjected to thematic analysis. To organize the many variables, the researcher will create categories or themes.

III. Results and Discussions

Characteristics of Participants

The data were collected from the School of Applied Natural Sciences (42%); the School of Civil Engineering and Architecture (11%); the School of Electrical Engineering and Computing (47%); and the School of Mechanical, Chemical, and Materials Engineering (25%). The educational backgrounds of the respondents are: Msc 67 (54%) and PhD 58 (46%) With regard to gender, the majority of respondents (82%) were male. Similarly, 70% of respondents had less than 10 years of research experience. The results of the data analysis on the status and contributing factors of university-industry linkage are presented in the section that follows.

Status of the linkages between university and industry in ASTU

Findings from quantitative data indicated that the majority of the respondents (62%) perceive that there is no institutionalized university-industry linkage in terms of research. Few (38%) of the participants expressed that the university, especially the departments, creates university-industry linkage in terms of internships, consultancy, and capacity building, but it is minimal in terms of research.

An interview with the technology transfer and community service department at the university would strengthen the above data. He added that even though there is a link between the university and industry in terms of consultancy services and capacity building, there is low research and development linkage with the industry.

From the interview result obtained, we can conclude that ASTU tries to form linkages with the industry through consultancy services, capacity building, and student internship programs, but it seems that there is low university-industry linkage in terms of research.

Factors that Enable and Hinder University Industry Linkage

Legal and policy Frameworks

National Science and Technology Transfer Policy

The first Ethiopian national science, technology, and innovation policy was endorsed by the parliament in 1993. The main objectives of this policy were to import, develop, disseminate, and create a well-technology literate society in order to ratify the role of science and technology in the country's development.

Later, by proclamation No. 604/2008, the government upgraded the agency to one of the cabinet ministries, accountable to the prime minister and the council of ministers, and reestablished it recently, in October 2010. To create a technology transfer framework that enables the building of national capacities in technological learning, adaptation, and utilization through searching, selecting, and importing effective foreign technologies into manufacturing and service-providing enterprises as an objective. On the basis of this objective, the Federal Democratic Republic of Ethiopia has prepared a Science, Technology, and Innovation policy focusing on building the technology capacity of medium and high manufacturing and service enterprises and has embarked on activities.

Higher education proclamation: The Ethiopian Higher Education Proclamation Number No. 1152/2019 has been proclaimed to achieve the following objectives of higher education: develop programs of study and provide higher education; prepare and supply qualified graduates in knowledge, skills, and attitudes on the basis of needs of the country; and award academic qualifications in accordance with its programs; undertake and encourage relevant study, research, and community services in national and local priority areas and disseminate the findings as may be appropriate; undertake, as may be necessary, joint academic and research projects with national and foreign institutions or research centers.

Even if the proclamation stated this, how to create university- industry links in terms of research and how it is implemented has not yet been expressed, and there is no law enforcement mechanism. Even though the proclamation order states that every higher institution shall have an institutionalized system that enables it to carry out planned research and conduct joint research projects with other national and international

institutions, research centers, and industries, but it is not well expressed how to form university-industry linkages through internal governance, and the proclamation does not force higher institutions to create U-I linkages by using institutional modes.

Intellectual Property Right Policy:

According to the Ethiopian Constitution of 1994, everyone has the right to own property. Property includes both tangible and intangible prop-erty owned by individuals, organizations, and communities (Ar-ticle 44). The federal government shall patent inventions and protect copyrights (Article 51(19)). The Ethiopian government establishes the intellectual property right case team and the first patent right proclamation was enacted in 1995 to create a favor- able environment in order to promote local inventive and related activities. By giving protection to local inventions, it encour- ages further creativity and the development of indigenous tech- nological capability. Through the protection it gives to foreign technology owners, it facilitates the transfer of foreign technol- ogy, and it is upgraded as an office that is responsible for the Science and Technology Ministry in 2003. Finally, the first in- tellectual property right policy is launched in 2003, Proc No. 378/2003.

Even if the intellectual proclamation is there, there are lots of limitations on creating university- industry linkages. For in- stance, the following issues are not well articulated: when does the researcher own IP? What is considered to be within the scope of employment of the researcher as far as IP is con- cerned? How is the benefit from the commercialization of re- search results protected by patents distributed among the dif- ferent parties? Who is the owner of the IP generated during contract research?

There is a lack of clearly defined benefit sharing mecha- nisms for commercially applied intellectual creations, such as research outputs of students and academics who use the time and resources of the institutes, the absence of a disclosure form or similar standard form for disclosure of new intellectual cre- ations, and a general consensus on the need for the formula- tion and implementation of institutional IPR policies that is not well articulated in the policy. As recognized from the interview conducted with the key informants, so far, Adama Science and Technology University has no IP policies.

Table 2: University internal policies. Source: field work

To what extent the university internal policies encourage university industry linkage in terms of research?

To High	15	12
Medium	20	16
Low	77	47
Very Low	31	25

University research policy encourage university industry linkage

Looking at the results by number of respondents, 47% (n = 59) and 25% (n=31) of them perceive that the university re- search policy encourages university-industry linkage at a low level, and very low level respectively. The other respondents 16% (n=20) and 12% (n = 15) reacted that the research policy of the university is high and medium, respectively. From the interview, the data, and the policy document, the researcher can understand that the university research policy is well expressed and identifies the research area. However, its enforcement and implementation power appears to be limited in order to engage in academic research.

Table 3: University budget allocation for research. Source: field work

How do you ratethe allocation of university funding andresource for research with the comparison of the university annual budget ?

	Respondents	Percentage
High	101	81
Medium	24	19
Low	-	-
Very Low	-	-

Research Budget

Among the respondents, 81% (n = 101) said that the univer- sity research budget is high, and 19% (n = 24) said the uni- versity research budget is medium. From an open-ended ques- tioner, the respondent expressed that the university research fund is adequate. Furthermore, the interview result from the technology transfer and university linkage also disclosed that, the budget allocated for universities by the government is rela- tively satisfactory. In addition, to see the trained of budget allo- cated at ASTU, the following three fiscal

years were reviewed: As depicted in the table above, from the total budget granted to Adama Science and Technology University, the budget allocated for research and development in the 2015 E.C. fiscal year was 17,335,040.00 (1.4%) of the total budget. Further, the data distribution portrayed that the budget allocated specifically for research purposes was slightly decreased from the 2014 to the 2015 fiscal years, from 1.9 From the questioner, interview, existing documents, and literature, it is possible to infer that, even though the past experience showed a slightly decrease in one year in relation to the total budget of the university, research funding is sufficient; the problem is the interest and commitment of the scholars to implement the existing resources and conduct technology transfer activities and academic research.

Table 4: Adama Science and Technology University 2013 - 2015 E.C fiscal budget distribution. Source: ASTU, Finance Administration Directorate (2022)

Program	2015	2014	2013
Administrative	280,290,700.00	304,335,000.00	275,325,580.00
Teaching learning	293,427,250.00	316,913,500.00	295,261,060.00
students' service	90,820,000.00	112,270,500.00	60,919,120.00
Research and development	20,910,510.00	27,566,000.00	20,626,280.00
Community service	17,335,040.00	24,716,000.00	24,716,960.00
Total formal budget	611,963,500.00	785,801,000.00	676,849,000.00
Foreign Instructors salary	150,000,000.00	156,000,000.00	132,000,000.00
Painting and other materials	100,000,000.00	600,000.00	2,400,000.00
Contraction and consultant	325,000,000.00	323,400,000.00	235,600,000.00
Total Capital Budget	575,000,000.00	480,000,000.00	370,000,000.00
Total Formal Budget + Capital budget)	1,186,963,500.00	1,265,801,000.00	1,046,849,000.00

Table 5: Technology and infrastructure facility. Source: field work

How do you evaluate technology and infrastructure facilities of the university ?	Respondents	Percentage
High	-	-
Average	75	60
Low	50	40

Table 6: The role of the university strategic plan in creating link. Source: field work

How do you rate the strategic plan in creating link ?	Respondents	Percentage
very low	16	13
Low	13	10
Medium	70	56
High	26	21

Research, Technology and Infrastructure Facility

According to the respondent, the university's technological infrastructure and facilities 60% (n = 75) respond that the university's technology and infrastructure facility is average and 40% (n = 50) replied that the university's technology and infrastructure facility is low. In an open-ended question, the respondent who said the university's technology and infrastructure facilities are at medium discussed that they are improving but a lot more needs to be done. The university has modest facilities to run laboratory-based analysis and pays attention to providing sufficient computers and laboratory equipment.

The role of the university strategic plan in creating link

According to quantitative data, the majority of respondents 70(56%), believe that the university’s strategic plan for establishing university-industry links is at a medium level. The literature result also shows that in directing priorities, strategic plans can help institutions shift away from the current system of disparate, fragmented, individualistic researcher collaborations aimed primarily at career advancement a problem encountered in many African universities and towards building overall institutional research capacity (Kruss et al., 2007). The remaining 13% of total respondents said the strategic plan was very low. Even if the strategic plan exists, it is not well implemented because the university is focused on the teaching learning process and academic research and technological innovation suffer from a lack of commitment and interest.

The interview result also shows that: The university strategic plan is well articulated, and it is our working guideline to perform our academic and research activities today. Not only this, but also university-industry linkage is well placed in the university strategic plan; the only problem for low-level university-industry linkage in term of research is that the implementation of the plan is not remarkable.

From the interview and data results, the university’s strategic plan for creating university-industry linkage is placed as a guideline; the drawback and problem is its implementation.

As demonstrated in table 6, 49% (n = 61) of the respondents reported that the industry’s engagement with university research and development issues is low in their respective school or department. The data is supported by the following interview results from industry investors and a follow-up experts from Adama Industry Park:

Virtually, the industry may get applied research and advanced technology from the university; unfortunately, we did not get this from ASTU as of today. The reasons for the limitation of the industry’s participation in the university are both the university and industry were limited by their compounding and hiding capabilities on routine activities.

The respondent who said industry participation is very low and low thought that a lack of collaboration and linkage culture on both sides, as well as a lack of well-appreciated mutual benefit, make the gap too wide to have appropriate and sufficient funding for academic research. The industries are not fully aware of the benefits of such research and development linkages.

Table 7: Industries participation in research and development issue

How do you rate the role of the university strategic plan in creating link ?	Respondents	Percentage
very low	51	41
Low	61	49
Medium	13 70	10
High	-	-

Industries participation in research and development is-sue

Leadership

To see the leadership level of competency and commitment for creating the linkage the following linkert scale was given as; N=Number; SA = strongly agree, AG= Agree, UN=Undecided, DA=dont agree and SDA=strongly disagree.

The data show that 46 (37%) and 65 (52%), respectively, people disagree with the level of leadership competence and dedication and competency of monitoring and assessment. Creating a transparent and comfortable working environment for every-one 54% (n=67) of the respondents believes that the leadership in their particular school or institute has not produced a transparent and comfortable working environment. Finally, when asked how devoted the leadership is to inspire the researchers, 51% (n=64) and 36% (n=45) of the respondents assessed it on the disagree and strongly disagree scales, respectively, indicating that they are not.

As a result, the level of university leadership competency and commitment is low; because they are struggling to achieve teaching, learning, and other routine bureaucratic activities, they are unable to think beyond the horizon in order to have the strong and desired link with the productive sector.

Academic staff

There are 512 current academic staff members at Adama Science and Technology University, of whom 173 have doctorates and 339 have master’s degrees. These individuals are typically in charge of starting and conducting research, supervising graduate students, and holding senior managerial roles. The research also showed that 54% of respondents have a master’s degree and 46% of people overall have a PhD. The university may be able to implement strategies and policies at the national level for promoting university linkages with industry and networking universities into the national innovation system based on these percentages of doctorate and MSc degree holders, but the following interview result contradicts this data.

The interview with university industry linkage and technology transfer department stated the following:

The academic staff’s capacity for producing novel research, which is necessary to attract industries’ attention, is limited. Instead of conducting applied research, they are more interested in conducting basic research, which may be a limitation of the academic staff’s role in establishing university-industry links. We infer from the interview that academic staff members are not dedicated to carrying out applied research and technology.

Challenges faced in university - industry linkage

In terms of research and technology transfer at the university level, there are a variety of challenges that can arise depending on the specifics of each institute’s and school’s research activities. Due to the absence of an institutional framework for university-industry links and an intellectual property rights (IPR) policy at the university. Interviews at the case sites show that there is IPR at the national level, but the policy has little enforcement capacity, which compelled the institution and the industry to forge close ties in line with the interests of the country. Leaders from the institution and the sector who are not devoted to planning, prioritizing, or establishing the link are other instances of particular difficulties. The leadership doesn’t motivate to bring applied research to the industries, and the industries don’t have an interest in bringing their problems to the university; a low level of clear communication is the main challenge.

There was also a lack of incentives mechanisms and modalities for university researchers that are allocated for university-industry linkage; a lack of interest and concern from the industry; a lack of confidence in the university research product; poor attention given to research in the industry; lack of facilities for high-tech research and expertise to operate the facilities. The university-industry linkage unit’s structure must be more powerful than its current coordination and facilitation roles; the unit has only played the coordination role and is operating on a small annual budget with little expertise, limiting the unit’s ability to exist, implement institutional IPR policies, conduct marketing activities, and form a technology incubation park.

Mechanisms to improve the low level university industry linkage

From the open-ended questioner and interview respondents, discuss the following mechanisms to create the required university-industry linkage:

University, industry, and government ought to establish working modes, and functional institutions able to establish to run and organize university-industry linkages. And also, a dedicated university-industry linkage unit could be functional in the university rather than acting like a facilitator.

It is advisable if the universities are working hard to raise awareness among industry owners by holding regular workshops, discussion seminars, and dialogue forums, as well as holding an annual research call for industries to promote and sell the university’s academic research and new technologies. Academic research ought to address industry problems and work to disseminate applied research findings to solve industry problems.

Table 8: Level of leadership competency and commitment for creating the linkage

How do you rate the quality of leadership and management in your university to create strong link with the industries in terms of research?	N	SA	N	AG	UD	N	DA	N	SDA
Level of competence and commitment	22	18%	20	16%	-	46	37%	37	29%
Competency of monitoring and evaluation	-	-	37	30%	-	65	52%	23	18%
Creating transparent and smooth work environment	30	24	-	-	-	28	22%	67	54%
Motivating the researchers	16	13	-	-	-	64	51%	45	36%

IV. Conclusions and recommendations

Conclusions

Based on the major finding of the study, the following conclusions were drawn:

One of the major objectives of the university is to conduct research and create technology transfer mechanisms by using this research; however, the result of this study conducted at ASTU demonstrates that the linkage in terms of academic research is low. Creating university linkages doesn't get priority attention from the university or the industry owner because the industry owners do not give priority to local technology and expertise. Not only that, but they are also profit-driven. Accordingly, the university's leadership focuses on other routine activities and bureaucratic issues. As a result, the status of the two actors involved in creating the link is low.

The recommended stakeholder groups—the university, government, and industry—did not put functional and institutional mechanisms in place to implement the policy in practice. The nonexistence of a patent-rights policy in the university is one of the hindrances among others to motivating the university academic staff to engage in the link-age.

Lack of good communication and different cultures between the university and industry were the other drawbacks, besides the fact that the industry owners don't have knowledge and the leadership of the university didn't pay attention to creating the linkage.

Recommendations

The university, government, and industry should all be actively involved in developing institutional frameworks to implement national and institutional policies; specifically, the integration of these three parties should be considered. Besides, universities, as key producers of research, should increase their participation in producing high-quality problem-solving research by creating smooth relationship with the industry. Specifically:

1. Industries ought to understand the importance of university linkage and should be willing to collaborate. This can be expressed by accepting and engaging intern students as they are their future employers, increasing trust on the capacity of university academics, providing their problems and their futures plans of development for universities and trying to achieve them jointly with universities and other ways.
2. University leadership ought to be dedicated to and skilled in the implementation of institutional and national policies, as well as in problem-solving and applied research in the interests of the industry, as well as in developing innovative strategies in line with the country's plan.
3. Universities' inability to undertake solid, problem-solving research or develop cutting-edge technologies was hampered by a lack of facilities for technology transfer and updating.
4. A variety of incentive strategies, for example, providing a national award, a high level academic rank, a salary increase, and intellectual property rights for their work are all important motivators for researchers to conduct fruitful academic research.

V. Acknowledgements

We gratefully acknowledge College Of Education and Behavioral Sciences Department of Educational Planning and Management, Jimma University. Moreover, Sebeta Collage of Special Needs Teachers Education is gratefully acknowledged.

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