# Higher Education Institute R&D Policy in Nepali Context

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**Abstract**

Higher Education Institute R&D expenses are very low and not institutionalize in the Nepali context which is one of the most crucial foundation of innovation and economic development. This paper focuses on the present context of R&D and prospective framework for the R&D collaboration with SMEs and industries. This is about to share infrastructure and the role of government as a coordinator to facilitate and develop viable policy to provide the opportunities for the national innovators and researchers. On this scenario, some short term plan can be applied and further, to extend for collaboration between universities and industries. Universities need to be transformed as interactive agency of development rather than pure academic institution.
**Key Words:** Higher Education, Innovation, R&D policy, Collaboration

1. Introduction

Higher education R&D expenses only 0.30% of the total GDP in 2010 in Nepal (UNESCO, 2015) which resembles its low level of investments over the scientific innovation and industrial spillover effects. The investment afterwards has not been increased so far. However, there are few universities and Higher Education Institutes (HEIs) which are able to carry out R&D; mostly following the liner model of R&D and less contractual research with industries; remaining are under the lack of financial misuse or corruption charges or the managerial efficiencies -for example: Purbanchal University was almost functionless for several months- to demeanor the R&D activities. Kathmandu Post, national daily published news on "PU comes to complete halt". Further, it says "the daily administrative work of Purbanchal University (PU) has come to a complete halt after the commission for the Investigation for the Abuse of Authority (CIAA) suspended and took under control several senior officials of the varsity on corruption charges" (Kathmandu Post, April 13, 2014). It is vividly observed that political intervention and financial mishandling in the higher education institutions in Nepal. The present challenge of the HEIs is to overcome financial and management crisis and capacity development not only the procedural, orientation related barriers in regards to academicians' limited time due to their traditional role and responsibilities, such as teaching, attending seminars and administrative tasks (Ramali & Seninb, 2015). It means HEIs needs structural reformation to make effective performance and enhance the quality of R&D.

Tribhuwan University the largest one has four different institutions to conduct research on multiple sectors of society. Firstly, RECAST (Research Center for Applied Science and Technology) is fully devoted to research on science and technology. According to the report of Agricultural Science and Technology Indicator (ASTI) FTE (Full time equivalent) R&D in agriculture by Institute of Agriculture and Animal Sciences (IAAS) is 24.4 whereas Institute of Forestry (IOF) constitutes 7.5 FTE in 2012 (asti.cgiar.org). Secondly, CEDA (Center for Economic Development and Administration) which is responsible to the development of policy, plans, programs for research to meet national demand. Thirdly, CERID (Research Center for Educational Innovation and Development) aims to focus educational research for the development of society. Fourthly, CNAS (Center for Nepal and Asian Studies) focuses on national socio-economic and cultural issues and international exchange of scholars.

Kathmandu University, a privately managed university has a division, Directorate of Research, Development and Consultancy to maintain all the research related activities and establish it as a teaching cum Research University. The research and development of Kathmandu University is far better in respect to its resources and budgets for R&D. According to the report of UNESCO this region's (South Asian Countries) academic capacity for teaching and research is also among the lowest in the world" (UNESCO, 2015, p. 574). There are many other privately established higher education institutions are overly concerned with market relevancy and immediate profits, and invest little in R&D (Bhatta, 2012). Many of the private institutions are affiliated with Tribhuwan University, Pokhara University, Kathmandu University and Purbanchal University. The HEIs are not able to conduct the research on their own due to economic constraints.

Therefore, the better alternative is supposed to collaborate universities and HEIs with SMEs (Small and Medium Enterprises) and emergent industries. The issue here is also lacking two way communications between HEIs and SMEs, although collaboration with SMEs is relatively more productive than collaboration with mature industry firms (Freitas, Marques, & Silva, 2013).

However, fostering university-business collaboration in R&D is complex but of significant importance for scientific advancement and for economic growth and societal wellbeing (Cunningham & Link, 2015) which is long awaited and less discussed phenomenon in Nepal.

This paper aims to reflect the present condition of R&D of HEIs in Nepal and further tries to explore new possible framework for the R&D enhancement through the university-industry collaboration. The university-industry linkage is crucial for the overall development of the economy. Meanwhile, government introduces much-awaited PPP [Public Private Partnership] policy (The Himalayan Times, October 18, 2015) which might have positive effective for the collaboration among the different stakeholder of development. It has opened up possibilities to work private sectors with government agencies because public sphere is called 'fourth helix' in the Triple Helix model of innovation (Etzkowitz, 2003). Therefore, hopefully the collaboration between public and private sectors enriches the further development of education and research. In such circumstances the main concern is that how can universities make effective R&D activities and output so that industry can trust on the university-research experts. How industry can utilize the innovation of /through the universities? What can be the reliable framework for R&D collaboration? Although HEIs have initiated round table discussion with industry-university-government to some extent, but the nominal efforts have been remained in discussion.

There are basic prerequisites to be fulfilled for collaboration between university and industry. The policy to address such kinds of university-industry collaboration is still in the conception period.

Nepal as the member state of WIPO also can utilize the universities patent protection by law and register intellectual property productions. No such university-industry patent policy enacted and pinpointed university-industry collaboration activities till the date. Furthermore, universities now should play a vital role as an entrepreneur retaining the traditional academic roles of social reproduction and extension of certified knowledge. As entrepreneurial universities they need to promote innovation as their new role in the society. In the present context of open market policy, government should play the role of mediator to open up the collaboration between industry and universities. In statist model government controls over universities and industries, but laissez-faire policy can be supportive for both of them. Industry is the driving force with other two spirals acting as ancillary supporting structures (Etzkowitz, 2003).

2.  Review of research works

In a research, Breznitz & Feldman ( 2012) analyzed the engagement of university for the economic development and financial returns but the contribution of university to the local communities con not be quantified to show a return. It still is not tangible or quantified the engagement of the university for the financial returns. University is considered as a pure academia rather than interactive agency for the local community (Cantwell & Mathies, 2012) in the Nepalese context. In what ways universities have expanded their research capacity to increase research funds in the United States. Whether research infrastructure, human capital and equipment are crucial? They found that traditional and new market based elements of the research capacity are responsible for the increment of research funding. The market has ben very competitive in the multinational production scenario. In the competitive stage of a new market economy in the global context, how universities can develop the strategies for effective R&D activities. Industrial sector has not been booming as required and able to compete with international market products. Because of this pity scenario industries are going to shut down every year remarkably. Industries shut down due to the energy crisis, lobour problems and inability of Nepali manufacturers to compete in the international market (Kantipur Daily,

September 27, 2014). In a special case of Nepal, market oriented issues played a prominent role to pull down the research plea.

In their studies (Freitas, Marques, & Silva, 2013) about the context of university-industry collaboration and the support of public research and educational organizations for the development and growth of industries suggested that universities may encourage the building of knowledge networks with industry, especially emergent industries. There has not been referable collaboration between university and industry either emergent or mature. Therefore, country needs to study for the multiple potential dimensions of collaboration and agreement with SMEs. A study conducted by (Maietta, 2015) has focused on how university-firm R&D collaboration impacts firm product and process innovation and assessed the determinants of innovation in a low-tech industry. This is assuming the impact of collaborative R&D to the firm particularly low-tech industries. The viable way at the beginning of university-industry linkage should be imitation –driven innovation rather than independent innovation.

University industry collaboration is heavily affected by intellectual property policies of partner universities regarding accountability and flexibility. Firms R&D intensity and top managers' education level are important determinants of university industry collaboration (Okamuro & Nishimura, 2013). In the developing stage of policy for university industry collaboration it needs to focus that how to mitigate the possible conflicts between two sides. Hence, government can play vital role for the mitigation of these tussles. The government, university and industry collectively can work for the innovation, research and development. Academic, industrial, and governmental institutions, each contain communication structures and culturally encoded messages that are sometimes difficult for outsiders to interpret (Etzkowitz, 2003, p. 5)

3. The role of government: A well discussed issue

Triple helix (three helices: University-Industry-Government) consists all three entities of helices with equal importance and let them flourish in their own but helping each other to uplift as well. The emergence of entrepreneurial academic ethos universities is able to generate new knowledge with application (Etzkowitz, 2003, p. 4) rather "mistrust" between academia and industry is latent that both entities do not likely to support at present and requires a comprehensive discussion and assimilation of drawbacks each other for welcoming investment and collaboration.

What government should do is to facilitate and provide a compatible policy framework for all entities. Hence, the essence of triple helix is stated by Leydesdorff (2005):

> The Triple Helix model takes the traditional forms of institutional differentiation among universities, industries, and government as its starting point. The evolutionary perspective adds to this historical configuration the notion that human carriers reflexively reshape these institutions. The model thus takes account of the expanding role of the knowledge sector in relation to the political and economic infrastructure of the larger society (P.1).

The bitter truth of the academia-industry relation which is differentiated fundamentally as their structure is different, performing pattern is different, but some common things which are crucial for both entities are not discussed in this respect. This is innovation, research and development which are largely explored by the universities and materialized by the industrial sector in the market. Somehow, industries are able to innovate in their laboratory, but universities better to work with incumbent.

Furthermore, industry can demand innovative ideas and designs as their needs from universities on the basis of contract basis. Both entities can be benefitted by flourishing and preserving intellectual property rights, patent, designs and market returns. Therefore, intensive discussion between university and industry is most inevitable in the Nepali context because organization's interactive relation is one of the successful bases for the R&D (Geisler, 1995). The dialogical model of interplay between two entities helps to enrich the further succession that how university should respond to the industry and how the industry should accommodate innovation of the universities. In the other way industries can plea of designing according to their requirements.

The sustained interaction processes between vertically integrated institutions like the industry and academia have generated internal differentiation processes within each of these institutions (Etzkowitz, 2003, p. 4). This issue is under the phase of discussion and so far questionable that how universities can help to generate knowledge and innovation to the industries. On the other how industries can welcome to the researcher institutionally and individually.

This paper reviews the policy and practice of R&D within universities and university-industry collaboration in Nepalese context. It is not a new phenomenon in terms of policy discussion, but these policies and dialogue have not been implemented as it could although, we have tried to review all of the existing policy regarding the R&D within HEIs however very few of them have

articulated policy according to the mawkishness of Research and Development. Data sources are used from the universities, research institutes and industrial publications. Interview with research officers of some selected research institutes under the Tribhuvan University and Kathmandu University are the primary information of this research. Some research collaboration with other research institute, INGOs, private company and foreign universities are examples to learn in this regard.

4. R&D activities in public and private sectors

Despite the few activities of R&D in the higher educational institutes there is hopeful mobility of collaboration by ICT sectors in Nepal. In comparison with public sector it has very less resources and accessibility although this effort is groundbreaking in the area of innovation and development and opening up R&D collaboration. A small scale companies and even by the individuals have been contributing in the ICT field globally (Tandukar, 2012). This is not satisfactory on the basis of The Global Competitiveness Index of 'capacity for innovation' which ranked Nepal129 out of 134 in 2012 (Schwab, 2012). However, some pioneer research faculties in Kathmandu University carried out hopeful projects in the R&D individually and collaboration with other partners. It is building a modern hi-tech turbine testing laboratory equipped with the state of art facilities with combination of Nepalese and Norwegian research and industrial professionals to develop new design philosophy of Francis turbine to resist erosion problems (Thapa, Thapa, & Dahlhaug, 2010) which has eminent significance in the development of hydropower projects in the country. But the genuine researchers have not provided space for the innovation and development. The compatible policy for the investment and innovation has lacked and legal framework does not accept innovation and not an internalized financing innovation as potential and lucrative area (Shakya, 2012), although university-industry collaboration, dialogue commenced in 1986 by the University Industry Cooperation Committee (UICC) (www.recast.edu.np). However, the result oriented activities are not held between university and industry. RECAST has delineated some challenges of not being accomplished through combined efforts to enhance R&D projects.

- University scientists are not so serious about commercialization of research results and undertaking industry-oriented research;

- There is a lack of understanding on the part of the university about the R&D needs and value system of the industry;
- On the other hand, the industry is lacking in understanding the capabilities of university faculty;
- The industry is not very concerned about innovation, as it seeks assistance from foreign suppliers of technology when confronted with any problem; and the industry has no confidence on the capabilities of domestic experts.

The above challenges identified by RECAST reflect that there is space for policy revision in R&D and needs to eliminate the misunderstanding between both "intimate" entities of innovation and development. To develop conviction between university and industry for R&D cooperation both sides needs to develop action plan. For example seminars and conferences can publicize the issue more effectively. Actions such as CSIT association of Nepal has conducted university-industry tie-up program to fulfill the gap between academic and industrial needs along with various conventions ([www.bsccsit.com](www.bsccsit.com)), which indicates that private sectors is also inquisitive to join with academia for their benefits.

5. Factors affecting to the R&D activities and collaboration

The major problem of development of R&D in Nepal is lacking the feasible environment and policy for research, publications, and other academic activities. There is no concerned body of the government to attract, support and evaluate to the prospectus researchers and keep record of it. Therefore, it is being a great cause of PHD brain drain every year. In the other way, universities structural development still faces challenges in the servicing, maintaining, and updating of infrastructure; and lacked adequate full-time staff even for basic core tasks such as management, student supervision and counseling; fostering teamwork in research and development, extracurricular work (including sports and cultural activities), and, most importantly, taking responsibility for academic program development and implementation (ADB, 2015). There is no demarcation in policy among the basic, applied and developmental research, so university graduates may not be confident over the research and development in their fields and cannot carry out further research easily.

The need of collaboration between university and industry has not been prioritized. Few cases of linkage with industry have low intensity due to insufficient understanding and resource related barriers. The discussion between stakeholders should realize that collaboration can be informal to formal through some research projects, contracts, equity partnerships and patent licensing.

However, long term and formalized research and innovation collaborations have high exit risks (Thune & Gulbrandsen, 2014). The university needs to focus on quality human capital generation, publications, interaction in conferences and develop expert groups. However, almost universities' nature is teaching-only in Nepalese context. To transform as research and entrepreneurial university there is high demand of investment and quality improvement.

6.   Framework to R&D activities

Nepali higher education R&D is mostly affected by the low resources, political turmoil and brain drain. Some universities have lack of proper policy and some others resources. Higher education institutions do not engage in strategic planning, and institutional leadership has not yet been recognized as a critical element. Moreover, institutions of higher learning in Nepal are generally highly politicized and subject to external pressures (ADB, 2015). On the other, industries are also heavily affected by power cutoff and tension between management and trade unions.

Although, lagging some other issues, namely low investment, quality products, market
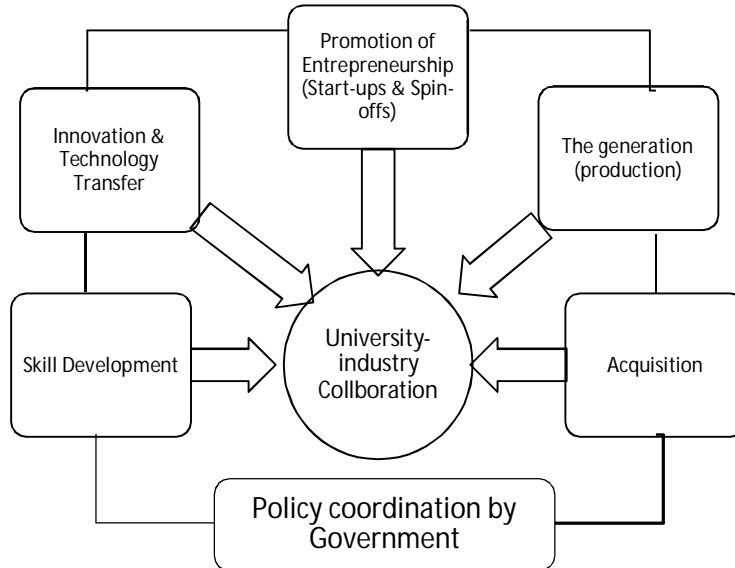


Figure 1: Prospective framework for the University-industry collaboration

competition, and skilled human resources also created a blockage in the assimilation of R&D. The R&D budget is also not sufficient from the government.

7. Dimensions of University-Industry collaboration

Nepal, as a least developed country need to follow a specific modality for enhancing innovation and learning in the informal sector. It should be aimed to shift toward more formal innovative and inclusive business. To expose the university-side and industry-side motivations and shared infrastructure utilization can be a good threshold. In between the university and industry government can play the role of co-ordinator to assist, monitor, evaluate and help to ease in policy obstacles rather than expect more at subsidies.

University-industry collaboration has different aspects to meet the expectation of both sides. To design support programs than more explicitly design beneficial pathways; from parallel projects to strongly coordinate efforts, or from symbolic interaction to parallel projects (Thune & Gulbrandsen, 2014). Skill development and continuous human resources supplement from the universities is basic requirements industry. Industries also make sure that the innovation and technology developed by university researchers is applicable. However, policy provision should provide guideline for it. Start-ups and spin-off seems reliable foundation for the companies. Production and acquisition only can motivate to the companies to collaborate with universities.

8. Concluding remarks

Nepali higher educational institutes, particularly university R&D has not been institutionalized yet. There is latent mistrust between academic experts and industrial sector. University-industry collaboration is only the way forward for the economic development and university rank upgrading in the region. Some of the scientists and innovative human resources have been seeking opportunity abroad because of weak R&D policy in the country. Universities are considered as a pure academic rather than interactive agency for the development process. To utilize domestic experts in their own companies and uplift the economic development government must design viable policy for upcoming days. Furthermore, intensive discussion

needs to devise a suitable policy framework for the collaboration. Definitely, there must be long term and short term collaboration modalities. The transition between traditional and new market oriented elements of the research capacity to help to increase research funding. Sustainable and continuous innovative benefit for both industry and university can be obtainable through long term collaboration (Koschatzky & Stahlecker, 2010). The better option for it is to be shared infrastructure utilization to motivate both university and industry side.

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