University–Industry Collaboration Framework: Individual Behaviors And Academic Engagement

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Abstract

The study on University- industry collaboration (UIC) extends the qualitative nature of research and literature by investigating the dynamic behavior and evolutionary aspects of University – industry and government linkages. Fifteen in-depth interviews conducted in Pakistan, Bangladesh and Malaysia provide the significance of different level, which University –industry collaboration which progress and relevant measures of achievement. The individual believes, mode of communication and understanding are collective factors, academic and corporate managers must deliberate the deviation in the kind of these aspects to confirm the success of UICs. This qualitative study provides individual behaviors, engage in the transfer of technology, innovation and commercialization with the engagement of academia to build effective collaboration. The suggested research base framework also finds out the valuable theoretical and professional implications and stated the policy for institutions and future research guidelines.

Keywords: University industry collaboration; individual behavior; commercialization; Communication

Introduction

It is generally acknowledged that academia and other government organizations play an acting role regarding current public intentional research system for fundamental innovation generation, the main focus is the knowledge base economy and transfer of technology to research base academic knowledge flow to the industry(Hall, Link et al. 2003;Bercovitz and Feldman 2006;Thursby and Thursby 2011;Archibugi and Filippetti 2015).University and industry collaboration are ensured by theses processes, in that context in their various ways, like spin-off;joint venture; joint publication;study projects; new patents and their serious role being acknowledged through policy maker, academic leader and researchers(Link and Scott 2005;Perkmann, Tartari et al.

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2013;Protogerou, Caloghirou et al. 2013).Over the past decade, there is observedthatan ample increase of theory on thistheme. Policy maker and researcher have highly sought the suitable way to effectiveness of the collaboration between industry and government revolving institutions at the local and state level.Universityenterepreneurship , research and development is discussing area around the pubic institution with context of policy to strength the linkages between institutions at an industrial cluster level , regional and government level. The linkage level has been restored and minimize the a few features have appeared as crucial.

First, science and technology has an important factor to collaborate with university, industry and government (UIG). This policy should provide the debate to contribute in some scientific function are more related to the industry other than firms and government institutions. This linkage affects the industry and academic researchers working in different fields.While change among different research fields have long been acknowledged, Presently these changes intensively debated in collaboration to research and innovative policy(Cohen and Fjeld 2016;Nelson 2016). Currently pragmatic research approach is marked in different ways of innovation ensuing from change in science and innovation base that depict different areas. Medical sciences intensely focus sector in this way of collaboration (Consoli and Ramlogan 2008;Nelson, Buterbaugh et al. 2011;Consoli and Ramlogan 2015).The collaboration between University and Industry is purely based on science, such as chemical, in a different way from other sectors also exchange like business and engineering(Meyer-Krahmer and Schmoch 1998;Hanel and St-Pierre 2006).A less Collaboration between Industry and academia has observed and least attention has dedicated special in humanities and management sciences(Gulbrandsen and Thune 2017).Significantly, transformation between scientific castigation have started to be accounted for toestablish the new policy(Gulbrandsen, Mowery et al. 2011;Gerbin and Drnovsek 2016).

A gap between commercialization and research exploration in different areas has been depending on basic research and applied in real life and benefit from the corporate world, tend to create a modern pattern of languages to revive the industry and other government institutions(Stephan and El-Ganainy 2007).To finally, on University and industry (UI) linkage have a number of articles published within a single sector like nano-technologies(Ponomariov 2013;Leech and Scott 2017), pharma industry(Giunta, Pericoli et al. 2016) bio-technology (Thursby and Thursby 2011), chemical (Kwiram, Koch et al. 1995) etc.. Therefore, the important of present research is needed in different ways

on the University and industry collaboration framework intensively onmore appropriate innovation policies for collaboration.

Secondly, the main factors of university –industry and government linkages have conventionally depended on geographical location and institution's role for smooth interaction(Ponds, Van Oort et al. 2007). In connection that this opinion is being added to observe at non-geographical measurement, such as institutional and organizational proximity. Some cases shown as having a big canvas impact on the presence of collaboration(Lindelöf and Löfsten 2004;D'Este, Iammarino et al. 2012). Acknowledging the importance of the regional level recognizing flow in innovation, economic growth and technology evolution are intensively involved by regional managements to aim creating the knowledge base economy (Feldman and Choi 2015). A number of initiative have been engaged in all western countries in view to strengthen the collaboration between university and industry , academic institutions putting the efforts to enhance knowledge and technology transfer   for economy differentiate .However , these efforts are showing the the evidence of efficacy (Lerner 2009;Albats, Fiegenbaum et al. 2017).

The present qualitative study, the policystated the ''Special focus on University–Industry Linkages: The Significance of Tacit Knowledge and the Role of Intermediaries'' edited by (Gulbrandsen, Mowery et al. 2011) and the ''Special Section on Heterogeneity and University–Industry Relations'' (Kodama, Yusuf et al. 2008) have both dedicated to the outmoded debate on UI linkages in advanced countries. The importance of University entrpreneurship has discussed and analyze in previous studies, in view of a special part of ''University Entrepreneurship and Technology Transfer'' presented in Management Scienceedited by (Mowery and Shane 2002), the entrepreneurs university concept started in licensing and mainly concentrated on the transfer of technology through university spin off.All development in research relates to the future generation and observed to streamline the research activities at University level to enhance the University and industry collaboration at large scale,researchers,institutions and other types of linkages .Perkmann, Tartari et al. (2013)presently stated and initiated the new concept of academic collaboration, which are supported out of the immense number of universities. University relation''represents inter-organizational collaboration instances, usually involving 'person-to-personinteractions' that link university and other organizations, notably firms'' (p. 424). This state that the new lines of potential ways of collaboration of University with Private segment are moving,its

contribution might be valuable engagement for academia as for the region.

As a final point, developing countries and least developing countries has shown the interest,where academics context and goals for regional development be pulled to different roles and need to forward according to the international pace. For example, if a national system of developing and transition states are in early stage, academics face the both types of challenges of collaboration in world science, and stating the national level economic and politicalissues.In that context, the priority of these nations might be differ to the desire to develop the knowledge base economy to keep up the research program.To know that the factors for universities and researchers, Industry and academia might counter the issues, which are existing to slow son the University and firm linkages. The main barrier to establish new policies and clarity to develop the economy through knowledge in developing nations.

Therefore, it is time to re-evaluate, how the present literature is emerging to enhance the relation of university-industry, current debates of literature focused on University – industry and government relating. Here, the aim of study to adding the fresh material to contribute in existing literature,which has focused on how academia linkages are moving at different area, individual level, industry level and government revolving institutional level, in all developed economy and least develop economies.

Aims and map of Collaboration

This study also discussed the a part included a specific line of collaboration to focuse on "University –Industry-government linkages" held a seminar at Higher Education Commission Pakistan " Skilllabour market, research and innovation system" held at Sialkot Chamber of Commerce during the visit of Prim minister in 2015 , University of London, in 2014 in addition to welcome the valuable Ph.D scholars in the field of UICs. Academic entrepreneurship, knowledge based economy and ORIC (Offices of Research, innovation and commercialization) role have discussed in different event organized by a Higher Education commission of Pakistan for better sympathetic linkages of University- Industry Collaberations (UICs).The purpose of this discussion is to congregation the contribution that is able to enhance the collections of research and uncovered the impression of academic relation by adding the literature on concept of University and Industry collaboration(UIC) along unpacked the different dimensions and role of actors involved in this field.

In this context,enticementsandbehaviors of differenteducational entrepreneurs;(1) Benefits and attitude of academic leaders: (2) role of university entrepreneurs;(2) Organizations's benefits and obstacles to collaboration with public research bodies; (3) Industry challenges in relation to government revolving institutions (4) Different behaviors, organizational culture and individual approaches in evolving industrial countries.

Individual characteristics, proximities and academic engagement
Foremost, the part of study section stated the individual characteristics of different behaviors. Cooperation is a social act of relationship between individuals,without any personal perceptions and state of different affairs of minds, be formed by gender , nature of institutions , industrial position and work relation of individuals not to be possible to create a relation.Too different characteristics , it is significant to study ' cooperation influences, such as the nearest of individuals to other structure, institution, society or other areas , a different of proximities that away the geographical boundaries(Crescenzi, Nathan et al. 2016).
Present literature has not deeply described the different nature of linkages at the individual level and factors of academic level in perspective of University entreprneurship(Etzkowitz, Webster et al. 2000).Rothaermel, Agung et al. (2007) observed that the analysis of different researchers and engagement in research and innovation process of academic entrepreneurship seen neglected in literature.Inproviouse years, mostly studies stated   different connection and individual cooperation has improved significantly, as discussed by Perkmann, Tartari et al. (2013), a valuable addition have specified on individual characteristics like university support to the researcher as drivers of University spinoff like sex, seniority and age. However, study has been noted to proximities, especially those areas that individual from different ones, in perspective of sociology, such as scholars behavior relate to to pro-social in recent studies (Iorio, Labory et al. 2017).

University–Industry Collaboration
A collective research and development, university spin off, licensing and intellectual property activities have been conducted in this form(Steensma 1996;Gulbrandsen, Mowery et al. 2011). Present form address the concentration of individual engagement. To cope the research services which are needed for collaboration to low level formal linkages to high level (Perkmann and Walsh 2007), corporate structure develop the university-industry collaboration (UICs) network. Selective research activities collaborate in different nature of partner , each level of

collaboration has separate objectives and unique level of reliance with the other level of collaboration between the parties .This position described the need for logical relations to develop the initiating approach of university-industry collaboration(Mora-Valentin, Montoro-Sanchez et al. 2004;Perkmann and Walsh 2007).In present research, university-industry relation between different level collaboration defined as UICs, "established to enable the diffusion of creativity, ideas, skills and people with the aim of creating mutual value over time" (Plewa and Quester 2007).

While UICs propose a mutually valuableengagements(Frenken, Hölzl et al. 2005;Davey, Baaken et al. 2011), to develop such cross-instituitional collaborations can be intricate, and most current research emphases on knowledge transfer office activities (e.g.Siegel, Waldman et al. 2004;Debackere and Veugelers 2005;Ambos, Mäkelä et al. 2008)or obstacles to collaborative commitment(e.g.,Siegel, Waldman et al. 2003),the striving of aligning institution of higher education and industries' interests in long-term corporations(Verheugen and Potocnik 2005). Other findings described the openness the activities of research and development, including the area and status of the firms,university, industry collaboration determinants based on these relations (e.g.,Fontana, Geuna et al. 2006). As a final point, a significant body of knowledge and literature relates to the success factors of UICs, such as management structure and culture(Santoro and Gopalakrishnan 2000;Siegel, Waldman et al. 2004;Bjerregaard 2010).

There is need to explore how the coordination and cooperation between industry and university could be fostere in a way that failure risk could be minimized, and how the industry and university can successfully resolve the issues involved within cooperation. The underlying research address these questions based on in-depth theoretical and empirical research. The results to be based on the experiences and perceptions of senior university officials and industry professionals that are currently involved in building the successful university industry (UI) partnership. The research highlights that the highly successful collaboration is the long-term partnership that could fulfil the interests of both sides. Santoro and Gopalakrishnan (2000)mentions that such successful and long-term partnerships are based on the shared vision, are interconnected with deepprofessional ties, and thrive within the environment of trust, where both sides actively seek to bridge the cultural gap between industry and academia.

Usually, the strategic UI collaborations offer the tangible benefits to both sides after five to ten years. Hence, it is a long-term collaboration and largely depends on persistence and willingness to ensure active

cooperation.Perkmann and Walsh (2007)comment that such long-term alliances require the upgradation of the human capital for making the collaboration work for both sides. The mutual trust and confidence count the most in such partnerships. In the course of time, a cooperative and well-managed collaboration results in high quality academic output in the form of well-prepared professors and graduates with a broadened understanding of the cultural divide.They can relate the research interests of organizations and co-operatively work for the accomplishment of the shared goal.

Research Design
Present research theory extreme to finds out the relation on existing theory by incorporating management and marketing knowledge regarding current literature (Edmondson and McManus 2007).We applied a qualitative research technique , detail depth interviews to unpacked the development of university-industry collaborations (UICs) and individual behaviors and conditions arethe main focused to develop an in depth interview for exploring the important concepts of UICs(Flint, Woodruff et al. 2002).The each technique of university industry collaboration is based on a valuable information likely to specially consider indepth interview approach ; The complication in UIC and least understanting of development of such collaboration suggeste the qualitative approac(Ticehurst 1999).

Sample
For this empirical study was discussed to perofessional delivered a prime source to address into the topic(Saunders 2003). The interview respondent belonged to different industry in Pakistan, Bangladesh and Malaysia and academic researcher of universities and research graduates. Both Pakistan and Bangladesh are developing countries, higher education system and research and development programmed challenges toward success,the main constraints of that nation have financial expenditure per capita on research and innovation structure(khattak 2015).

However, university funding efforts are going high in Pakistan, but their funding system differs from Malaysia where in Bangladesh, a low competitive factor funding system is prevailing.A relational success factors despite in terms of the same nature between Pakistan and Bangladesh ,the presence of information from these two different states and system reduces the base of different footing of university industry collaboration (UICs) and their funding system.Respondent were recognized as profession on the basis of there engagement and impact of

university industry collaboration roles on decision making.The participants represent the different firms and research areas like FMCG (fast moving consumer goods), life care, Pharmaceuticals and engineering, government institution, information technology and academic managers, to covered main different perspective and ignor the industry base specific biasness.The university representatives had diversed back ground of research areas , including information system , agro-farming , social sciences , medicine , applied science and marketing.

Table 1: Sample Plan

Pakistani Respondents	Malaysian/Bangladeshi Respondents
5 University researchers	4 University researchers
2 medium experience with UIC	2 medium experience with UIC
3 high experience with UIC Agriculture, engineering, science Medicine, social sciences, 3 industry partners 2 medium experience with UIC	2 high experience with UIC Agriculture, engineering, science, Medicine, social sciences, 3 industry partners 2 medium experience with UIL
1high experience with UIC Engineering, science/ pharmaceuticals Government agency, life-care provider.	1high experience with UIC, Engineering, science/ pharmaceuticals,Government agency, life-care Provider.

The participants designated their self-rated level of involvement with university, industry relationships; principaltwoidenticalareas of people with adequate and high levels of involvement in UICs. The area of experience was establishedduring the discussion by seeing the number and depth of UICs, knowledge and experience was necessary for the data gathering, for the reason that it allowed to collect the information about UICs from each participant ,severalreported evidence are related to collaboration with different associationextents and depth interview .

Data collection and analysis
The data sources can be broadly divided into two main categories: primary data sources, and secondary data sources. The secondary data sources were mainly comprised scholarly articles, published reports, government documents, annual reports, company websites and a comprehensive review of past theoretical and empirical studies. Primary data sources for the underlying research include in-depth structured interviews with the higher education institutions and senior management from the corporate world.

The researcher analyzed the collected data by employing research software. The qualitative insights were discussed with the help of NVIVO. The use of secondary and primary data sources enabled the researcher to provide a comprehensive framework for enhancing the university-Industry linkage. For this purpose, the researcher analyzed different reports to analyze the current situation of academic sectors.The conceptual construct validity was examined in data collection methodology and found a minimum potential of the business.In connection of interview members confirmed that on basis of historical background, different areas of life and unique market perspective have linked to them , firm and in assistance to researcher to provide the varity of information sources(Patton 2002;Choudrie and Lee 2003).

Findings

When university depth interviews were conducted from different respondents of the university, the majority of the respondents is agreed that the universities must take initiative in collaboration with different firms. Universities are not paying attention toward directly involved in the industry by using different linkages. They have shared the experiences, they emphasis to minimize the challenges as they faced in the universities especially in the public sector. Majority of respondents' answer was different, everyone highlighted the need of linkages as he/she not presently involved with the industry.

A person who has practical experiences, he/she can share and give a better opinion. Majority respondents said, there is a need of promotion of research base knowledge transfer with firms. Unfortunately, currently are lacking, they are not engaging their faculty or students with firms to get the practical knowledge. The list of major challenges that were prominent by respondents is given below.

1. Involvement of the universities in the industry can be done by using faculty.
2. Members and young researcher in the industrial project to increase their skills and knowledge and it can also decrease the industrial cost of R&D.
3. In Pakistan universities are not plane towards their involvement in the industry.
4. A knowledge exchange channel in required in the universities which can help the young researcher to interact with the industry directly. Knowledge exchange is always better than technology or innovation exchange
5. When industry depth interviews were conducted from different respondents of the firms, the majority of the firm manager

respondent stated that the must take initiative in collaboration with local universities and government institutions. There is a lacking area between academia and industry. Currently, There are not well associated with any university, but it suggests to revise the policy if there is a good opportunity. Most respondents, they have practical experience of different industries they shared field experience and business problem   during the interview session as they faced during dealing with business   Majority of respondents' answer was different, everyone highlighted challenges as he/she observed.

A person who has practical experiences, he/she can share and give a better opinion. Majority respondents said a proper mechanism is not maintained in university side as well as government bodies. Instead of highlighting every individual response, the list of major challenges that were prominent by respondents is given below.

1. Pakistani industry is facing taxes and other regulatory problems in Pakistan.
2. Currently collaboration among the industry and universities is very low.
3. There is no incentive from the government side for those industries who collaborate with the research institutions.

University–Industry Relationship Success
The meetings and interviews made it clear that the universities, through need, have been produced to act like training organizations. The universities' linkages to industry were not made through research and development, but instead as a provider of a prepared trained workforce. Afterward, as research was included in universities' main goal through the national instructional approach, the customary technique for correspondence with industry was through the distribution and scholastic journals. In terms of universities' parts, universities as a focal players have two sides to serve in the coordinated effort with government, industry and different associations/organizations;

• *Academia as supplier*
Universities are to assist the business in the following ranges:
1) Quality base graduates significant to modern and community needs,
2) Research/information/advancement,
3)Business Incubation centers,
4) Knowledge exchange programs,
5) Solutions to issues/challenges,
6) Organization consultancy

• *Academia as demanding*

Institution of higher educationrequires assets and joint effort with both government and industry to adequately serve the business as specified above in the accompanying zones:

1) Financial and hardware bolster,

2) Enterprise procedure to wind up a noticeably entrepreneurial institution of higher education,

3) Technology exchange from multinationals /JV Organizations,

4) Teamwork with firms for temporary positions, helpful program, and research facility/instruments.

In terms of University based research, the innovation and research item advancement from universities' exploration and research department has not been noteworthy. In this manner if the business prevails in high innovation ranges in vehicles' hardware, there is a low level of commitments originating from University based scientists and researchers.The business and industry desire of the universities was the supply of very much prepared HR, as opposed to the creation of imaginative innovations from logical research. From the business' point of view, the universities were the instructional hubs to produce applicable workforce. Since firms did not get financially significant logical information from the universities, they received a methodology of either building up their own innovation or bringing in cutting edge innovation from cutting edge nations.

Conclusion and implications

Present study facilitates to (1) provide base line to formtheframework of UICdevelopment, (2) defines the dimension of success and (3) the arrangement of collaboration found the formal factors of success.University and industry factors help to accomplish the these objectives. Though we arranged a bifurcated series of in depth interview in Pakistan, Malaysia and Bangladesh.The success of these conclusion procedures was recognized by several factors, the success of these outcomes pinpoint the respective relationship framework to evolve the collaboration by confirming through UICs:Financial and enterprise procedure,collaborationissues,communication, research and innovation center ,understanding, trust, and individual behavior. Each level achievement relates to the drivers of demanded by UICs, due to variation in the different nature of success by lifting factors, university, industry collaborations need to directed and address the academic management and corporate as well.Primary collaboration factors build a confidence and credibility to transform the personal trust relationship and communication University industry collaboration evolved to the success

of drive factors, the process of achievement recognized to shape the study framework on UICs

This research recognizes the difficulties and challenges in realizing competition between universities and industry to accomplish to bring the level of ability in economic differentiate and business advantages. This investigation demonstrates a hole between organizations' innovative limits and essentials and academic research and training. Just a couple of state funded Institution of higher educations have made the stride up from establishments of teaching toward research oriented universities, while most Pakistani organizations are not keen on research & innovation and do not demand refined scholastic administrations since their research & innovations is controlled by remote customers. In addition, academiaand organizations concur that most institutions of higher education have deficient limit and assets to successfully create technological important graduates and pertinent researchers, while organizations are not inspired by long haul joint efforts with institutions of higher education due to their budgetvalue analysis being on a transient premise. These have prompted an absence of trust between the twodifferent clusters of players. Additionally, the government has not assumed a dynamic part in elucidating their imminentrevelation of the product base economy, connecting distinctive players in the esteem chain, and distinguishing a focal association to enrichthe industry intensity with adequate assets, adaptability and sovereignty.

These new foundations enhance capacity and competitiveness of the industry and its players. Neighborhood Technical organizations must be empowered through government arranged policies, for example, incentive plans to create a higher value-added product identified with the recognized specialty markets, for example, electronic infusion frameworks, shape and bites the dust, dances and apparatuses, electronically monitored slowing mechanisms and substrates for exhaust systems to increase the value of nearby generation while facilitating absorptive limit and specialized learning.

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