Paper ID: KL-06

University Industry Linkage for Indigenous Development: A Case Study from Developing World

Abdul Ghafoor
School of Mechanical and Manufacturing Engineering
National University of Sciences and Technology
Islamabad 44000, Pakistan
Phone: +92 51 9085 6001, Email: aghafoor@smme.nust.edu.pk

Abstract

Universities around the globe are seen pursuing University-Industry Linkages (UILs) more aggressively in the recent years than ever. This indicates that the universities have assumed a new role of contributing in the nation buildings through helping the industry. There is no doubt about the role played by the universities in the world's developed countries. The key players in the industrialization of the nations are the Governments, Higher Educations Institutions (HEIs) and the Industry. Their role towards each other has been defined in Triple Helix Model. There are however cases in which countries like Norway and Australia still feel that UILs have to be strong and to be pursued objectively. Currently the leaders of higher education have also been given a new role and are being asked to have focus on research, innovation and commercialization. It has been realized that the role of (HEIs) should also include building of economies, communities and leadership. UILs bring the universities and the industry close to each and help repose the confidence among both the parties. These linkages have proved as a successful tool for finding Indigenous solutions to the industry and national problems through the involvement of the academia. On the other hand, the industry can also help universities with the R&D funding, commercialization of the innovations and helping in design of the university curriculum that are relevant to the industry. Cooperation between the universities and the industry is a win-win situation for both. At National University of Sciences and Technology (NUST), Pakistan, UILs were started under Corporate Advisory Council (CAC) that was specifically established for the purpose to bridge gap between industry and academia. CAC has leading industrialists as its members who work with the senior members of the academics. CAC forum has helped both parties understand strength and need of each other. This arrangement has worked effectively and some success has been achieved.

This paper discusses some of the UILs models being followed by the developed countries. The paper also discusses the initiative undertaken at NUST to establish UILs under the model of CAC and the success achieved under this arrangement.

Key Words: *University-Industry Linkages (UILs), Higher Education Institutions (HEIs), Corporate Advisory Council (CAC), research, innovation, development, commercialization, role of universities and higher education*

Acknowledgement: The author is thankful to the Corporate Advisory Council (CAC) secretariat officials for their help in providing the relevant data related to university-industry collaboration at the National University of Sciences and Technology (NUST).

Introduction

Growth and development of any nation are linked to the Government policies towards its industrialization. The industrialization on the other hand is strongly based on the trained human capital of the country. Nations have been striving to capitalize on the factors that include preparation of favorable policies by the Government to attract the investment and provision of resources for the training of required manpower. The industrialized nations worked hard, identified the key factors and exploited for the growth. They are progressing at a faster speed as compared to the developing nations who failed to mobilize their resources. The key components for the growth and the development are; the Government itself, the Industry and the Higher Education Institutions (HEIs). Each of these has a role towards others. Role of three towards each other has been defined in a term named Triple Helix Model. Triple Helix Model has been evolved about half a century ago and still evolving with new rolesof its components (Leydesdorff, L. and Etzkowitz, H.). The Triple Helix Model and its evolution stages are discussed in this paper.

In the HEIs, faculty is the brain and has the most important role to play in the social and economic development of the nations. World's leading nations have used this intellectual property in efficient and effective manners. On the other hand many could not exploit these resources and are lacking. During the past quarter of a century, some but limited activity is seen in developing nations where the professors have assumed the responsibilities of writing business plans, gaining expertise in raising funds for themselves and the institutions through various entrepreneurial activities.

University entrepreneurial activities of scientists can be traced back to couple of hundred years and hence cannot be termed by any means new phenomena (Etzkowitz, 1983). Over the period, the approach followed by the university professors was continuously refined across the globe. As a result, more focused and result oriented methodologies emerged (Shimshoni, 1970). More activities of the Professors are noticed in the recent past where they have established their own businesses and are managing full time besides their academic activities (Krim-sky et al., 1991 and Plewa et al., 2013). Different universities of the world are following various models to work with the industry. National University of Sciences and Technology (NUST) has established Corporate Advisor Council (CAC) to have a close liaison with the industry of the country. This approach has worked effectively and both the entities are interacting for benefit of each other. This model is discussed in detail in the paper.

Triple Helix Model and its Evolution

Triple Helix Model symbolizes the overlapping role of its three key components; Government, Industry and Academia. This name has been given to precisely explain the importance of the role of three entities towards each other and in the nation building. The nations that have developed well have very clear role of all the entities. They work hand in hand with clear understanding. The Government role remains of formulating policies and providing resources required for Human Resource (HR) development to the academia and industry while the industry has generate revenue for the country by employing the trained HR and following the policy guidelines. The academia responsibility has been to train manpower for the industry and government.

The evolution of Triple Helix Model can be categorized into four stages. During first stage, the role of its three components was only of formal nature with least virtual no interaction between academia and industry. Three components continued their function till somewhere middle of twentieth century. Second stage of evolution of cooperation between University, Industry and the Government can be seen in the third and partly fourth quarter of the twentieth century when the interaction between all of them was increased and the time when maximum progress in the industrialization of the nations can be seen. It was actually this interaction and the growth resulting from it that name of Triple Helix was realized. During last quarter of the century, the role of Triple Helix entities has been of overlapping and evolution of Science and Technology Parks (STPs) has been observed. The entities have moved out of their foothold and economies are seen being built as a result of functioning of STPs. This era can be named as third stage of evolution of Triple Helix. In current days, the key players in the socio-economic development of the nationsare working beyond their boundaries in the form of Global Think Tank Networks (GTTNs) and proving all kinds of support to each in the form of policies guidelines, advisory and consultancy services (e.g., Pires and Castro 1997; Gulbrandsen 1997). The stages of evolution of Triple Helix are depicted in the Figure 1.

Role of Universities in 21st Century

The Universities need to be ready to accept the challenging role in the current century. With the evolution of Triple Helix Model and revolution of industrialization across the globe, the Universities have to transform themselves from mere teaching and R&D role to the entrepreneurial ones. With the fast changing life styles, the Universities are expected to contribute in the building of economies, communities and the leadership. The managers of the Higher Education Commission (HEC) and leaders of HEIs of Pakistan have set the medium term development framework to have transformation through the establishment of Office of Research, innovation and Commercialization (ORIC) in the Degree Awarding Institutions (DAIs) of the country. NUST has moved a step ahead by institutionalizing the UILs under the CAC and increasing the interaction with the Government by launching GTTN. The changing role of HEIs over the period is shown in the Figure 2. The universities of the current era are expected to have moved up the ladder as shown in the figure. Those at the top of the ladder can be said contributing the most. Universities in the leading and industrialized nations have already adopted new roles of being entrepreneurial and giving advices to the Governments on policy guidelines. HEIs in the developing world need to move faster to catch up the ever changing demands of the society and industry otherwise the gap between developed and underdeveloped nations will be widened.

Example of UIL in NUST Pakistan

As mentioned above, university-industry need to join hands for mutual cooperation as well as provide a platform for policy guidelines to the Government on social and economic issues. Universities having the largest clusters of intellectuals have the leading role to be played. Specifically Science & Technology Universities all over the world make significant contributions to the development of technologies which are essential in an economy.

Fully realising the responsibilities, the academic programs of the NUST are designed to meet the national needs and challenges of the new millennium. Fields of Engineering, Life Sciences and Natural Sciences are continuously updated with emerging trends; at the same time, modern disciplines are being offered to prepare professionals to manage the ever-growing demands of a knowledge economy with requisite degree of expertise. NUST aims to develop itself into a Centre of Excellence for advanced scientific and technological research, and to emerge as a leader in academic research in Pakistan. These objectives are being fulfilled through the induction of the most brilliant and dynamic faculty, and providing their mental and creative abilities with a nurturing and enabling environment. This has facilitated excellence in R&D at the NUST schools.

Corporate Advisory Council; Model of UIL at NUST

In conjunction with the academic research, NUST has also laid emphasis on practical, solution-based, Industry-specific R&D, both for the training and development of our students, and for providing support to the local Industry. One of the advantages of NUST's location is its close vicinity to Islamabad's Industrial and Corporate Sectors. Through the combined and multi-disciplinary strengths of 18 constituent Schools, Colleges and Institutes, NUST is well-equipped to serve several Sectors of the economy with its intellectual capital (1000+ faculty and 12,000+ students) and state-of-the-art lab and research infrastructure. At the same time, it has been reported that currently there is at least a wastage of about 10-12%, which amounts to approximately USD 20-25 billions. It is also clearly understood that these wastages can be removed through knowledge input and technology, and the gaps can be filled through University-Industry linkages (UILs). The technical and academic strengths of NUST; combined with the needs of the Industry to find innovative, practical and cost-effective solutions; and the need of the economy to flourish through advancements in technologies; are the basis for the establishment of the Corporate Advisory Council (CAC) at NUST.

The CAC was formed in 2010, with the simple mandate of having a positive impact on the socio-economic development of Pakistan through active engagement with the Industry. The CAC has developed linkages with

industrial and business enterprises across 11 Sectors of the economy. The CAC is headed by the University and along with him is Professor Emeritus as the Co-chair having experience of working with the Industry within and outside Pakistan. Each Sector Committee is headed by an Industry Co-Chair and a NUST Co-Chair, and comprises members from the Industry and NUST schools. The CAC Partners in its 11 Sector Committees include the leading names from different Industries, including Indus Motor Company Ltd, Atlas Honda Litd., Huawei Technologies Pakistan, House of Habib, Asian Development Bank, National Bank of Pakistan, Fauji Foundation, Siemens Pakistan Engineering Company, Oil and Gas Development Company, NESPAK, Pakistan Atomic Energy Commission, Planning Commission of Pakistan, Ministry of Science & Technology Pakistan, and many others.Also part of the CAC are senior representatives from Government establishments, thereby creating a unique *triple-helix* combination of Academia, Industry and Government, engaging in advisory, consultation and R&D collaboration. Organizational structure of CAC is shown in Figure 3. The structure of each sector committee is given in Figure 4.

The CAC brings the NUST Institutes and the Industry together on a common platform, enabling them to join hands to find workable solutions, through R&D, to real-life problems encountered in product development, design and commercialization. The projects that NUST schools engage in with the Industry add value in terms of process efficiencies leading to cost reduction or quality improvements, product improvements, product or process innovation, etc.

In a period of less than 3 years, the CAC membership has grown to include more than 150 members from top-line local and international business and industrial firms, banking and investment houses, high-level public policy-makers, and intellectuals. Cooperation and collaboration between Industry and NUST Academia has led to innovative projects aimed at providing solutions to Industrial and Corporate partners. Coming together on the CAC platform has also enhanced inter-Industry linkages, which, in turn, is strengthening University-Industry linkages. Moreover, it has helped human capital development at NUST in more practical, Industry-specific, and meaningful terms, ranging from the curriculum, which is continuously revised to include Industry orientation, to student placements including internships, on-the-job training, and employment within the industry, creating an overall environment of Industry-specific human capital development. The CAC and NUST have several international collaborations including foreign universities, business councils, and corporate entities.

Conclusion

Today, there is more understanding in the Universities and the Industry than ever. Governments are also laying a lot of emphases for having collaborations in the form of UILs and establishment of STPs. It however needs to be understood that success of these models lies in having confidence in own institutions. The models have proved to be successful in the industrialized nations and therefore others must follow without wasting more time.

Reference

Etzkowitz, H., (1983), Entrepreneurial Scientists and Entrepreneurial Universities in American Academy Science, Minerva.

Krimsky, S., Ennis, J., Weissman, R., (1991), “Academic-corporate ties in biotechnology: a quantitative study” Science, Technology and Human Values 16(3),275-287,Summer.

Shimshoni, D., (1970), “The Mobile Scientists in the American Instrument Industry”, Minerva 8(1).

Plewa, C., Korff, N., Baaken, T. and Macpherson, G. (2013), “University-industry linkage evolution: an empirical investigation of relational success factors”, R&D Management 43:365-380. Doi: 10.1111/radm.12021.

Etzkowitz, Henry and Leydesdorff, Loet (1997), “Universities in the Global Economy: A Triple Helix of University-Industry-Government Relations”.

Pires, Artur da Rosa and Eduardo Anselmo de Castro (1997), “Can a strategic project for a university be strategic to regional development?”, Science and Public Policy 24(1) 15-20.

Gulbandsen, Magnus (1997), “Universities and Industrial Competitive Advantage”, pp.121-131 in:
Etzkowitz, Henry and Leydesdorff, Loet (1997).

Unlinked References

Ghafoor, A., (2013), “Role of Higher Education in the Socio-Economic Development” International Conference on Intellectual Capital Management, held in Zanjan, Iran, 11-12 Sep, 2013.

Higher Education Commission (HEC), Pakistan, Policy Documents.

National University of Sciences and Technology (NUST) Corporate Advisory Council (CAC), Pakistan Policy Documents.

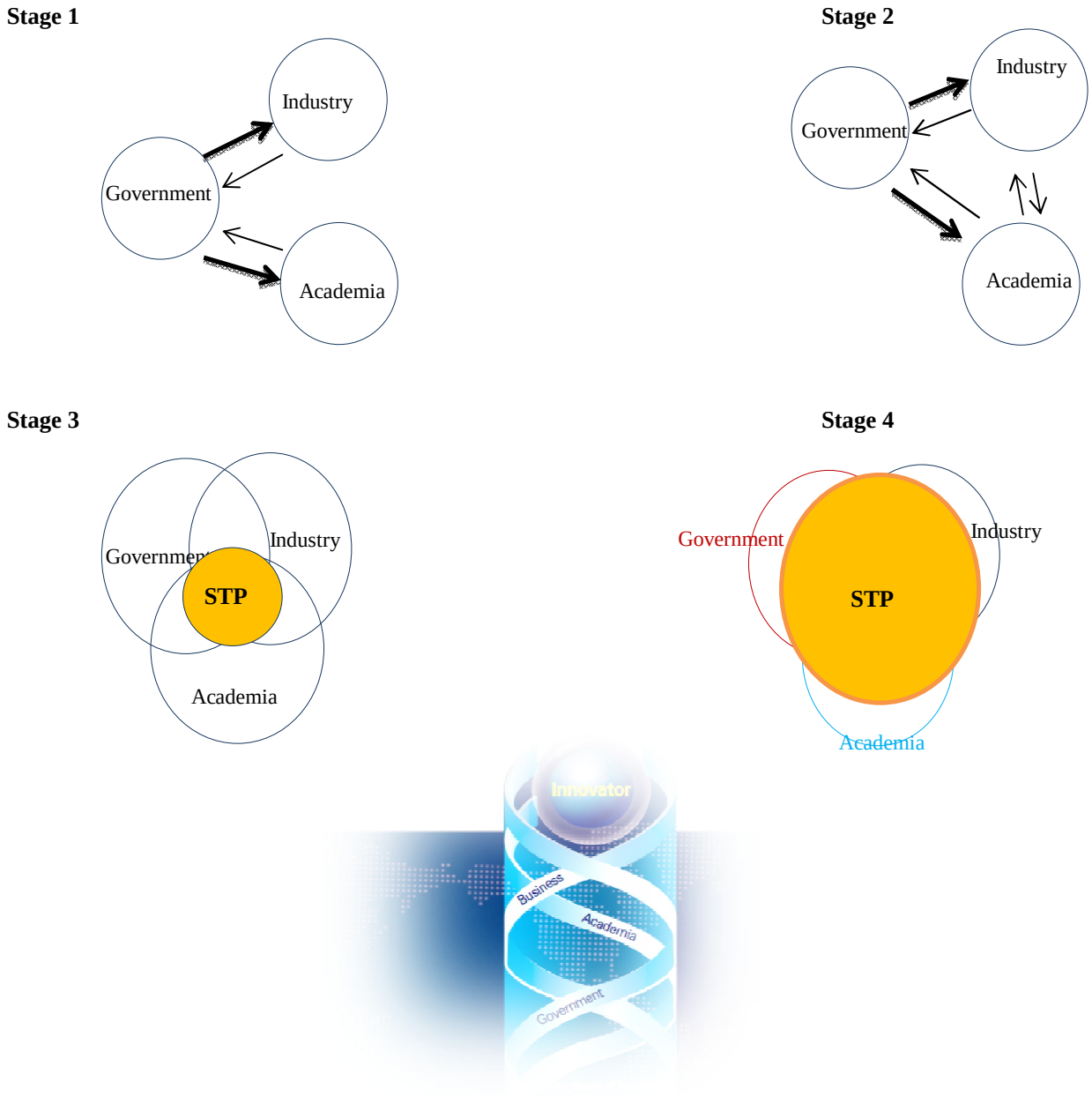

Figure1: Evolution of Triple Helix Model through various stages

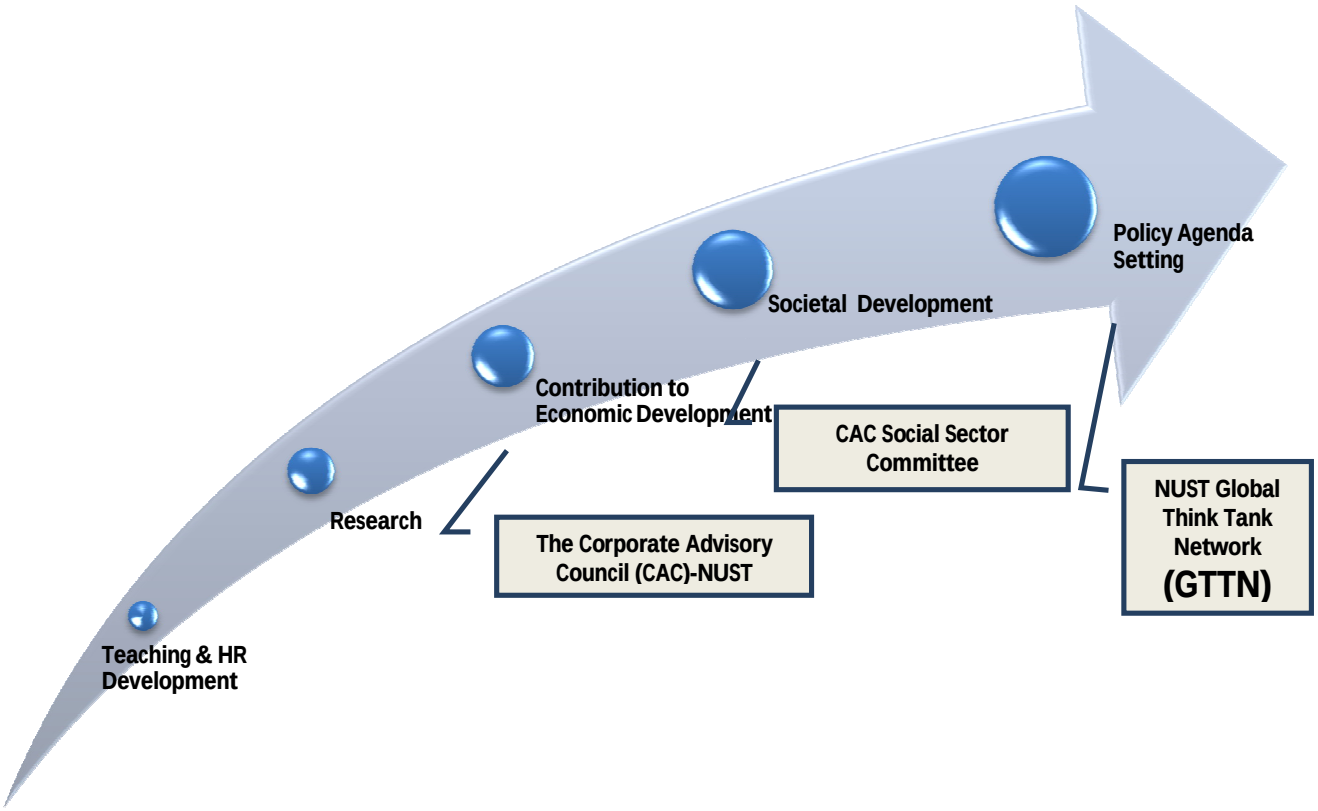

Figure 2: Role of universities as evolved over the period

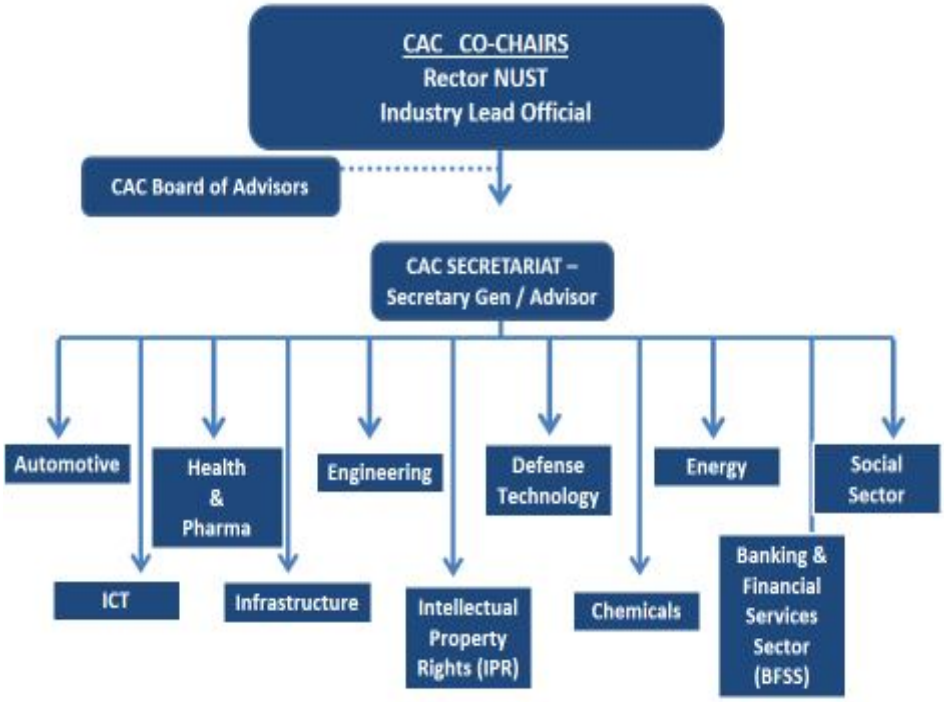

Figure 3: Organizational Structure of CAC

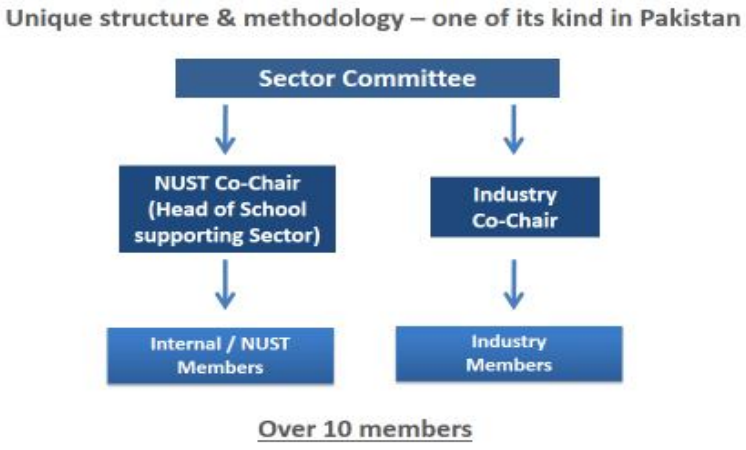

Figure 4: Structure of Sector Committee