PAKISTANI UNIVERSITIES: SYNERGY THROUGH ACADEMIA, INDUSTRY AND GOVERNMENT COLLABORATION

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Abstract

Universities are supposed to be engines of innovative ideas and research; besides promoting high-quality education and research, they contribute to national growth and development. Overpopulation, along with measly spending on health, education and social welfare, has relegated many Muslim countries to the bottom of the global pile. Allied with adverse international factors, illiteracy and militancy have become rampant. It is said that the total number of universities in the Muslim world (nearly 700 or so) are lesser than that of Japan alone. The national budget earmarked for education is below 2 percent, whereas according to the UN requirement, it should be a minimum of 4 percent of the GNP. Experts recommend at least 10 percent for the next decade or so if Pakistan is to cast off the albatross of poverty, ill-health, and illiteracy. The plight faced by most Pakistani universities is that they are woefully starved of funds, talent, and other facilities. To overcome these, research, value-added items, academia-industry-defence linkages, 'disruptive innovations,' new technologies in IT, biosciences and genetics are imperative. For this, the Helix Model is proposed that would focus on an academia-industry-business model of cooperation. This could assist in forging much-needed skills, promoting educational standards, instilling self-reliance and contributing to a knowledge-based society and national development.

Keywords: *Universities, Islamic World, Triple Helix Model, Research and Innovation, Synergy, Academia-Industry-Government.*

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Introduction

In his book, "The Idea of a University," John Henry Newman (1852) defined a university as a place for the communication and circulation of thoughts. It is a place where inquiry is pushed forward, discoveries are verified and perfected, and error is exposed by the collision of mind with mind and knowledge with knowledge. In fact, the universities, based on Newman's and Humboldt's principles, have been remarkably successful and have provided an almost universal model for higher education.

With globalization, universities are now regarded as fundamental national and international assets. Governments worldwide see them as vital sources of new knowledge, innovative thinking, providers of skilled personnel and credible credentials, contributors to innovation, attractors of international talent and business investment, agents of social justice and mobility, and contributors to social and cultural vitality. Thus, over the last decade or so, the view is that high quality, internationally competitive research and higher education mostly contained within universities are prerequisites for long-term success in globalized knowledge economies. In fact, public policy sees universities as vectors of the contemporary skilling of an increasing segment of the population and as providers of innovation that can be translated into an advantage in a fast-changing global economic environment.[1]

Today the state of universities in the Islamic world in general is both worrisome and challenging. Allocation of funds to education and health are abysmally low, which acts as a serious impediment to national development. The Islamic World represents one-fifth of the world, with 57 OIC countries, possessing 70 percent of the world's energy resources and almost 50 percent of the world's raw materials. Instead of being an economic giant, the Muslim world contributes only five percent to the global Gross Domestic Product (GDP) - thus reducing it to an inconsequential entity in global political, economic and social affairs.[2] No wonder, this is strongly correlated with current socio-economic issues of underdevelopment incubating intolerance, violence, and militancy in these societies.

It is strongly felt that universities can play a major role in research, innovation and dissemination of knowledge, as they do in the developed countries, and they can act as engines of socio-economic and cultural development. Furthermore, they can nurture and shape the minds of the youth to become motivated, humane and proactive citizens of the state. In short, they can act as a powerful catalyst of socio-economic and cultural

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1 Aziz Ahmed Qureshi, "Role of Universities in the Industrial Development," Chapter 2, 9-16. Adviser, Department of Physics, Universities in the Islamic World (Islamabad : COMSATS Institute of Information Technology, July 2014), [Unpublished].

2 See Ambassador (retd) Shamshad Ahmad, "The Muslim World: Medusa's wreck," *The Express Tribune,* Islamabad, 19 July 2014, 7.

transformation – even 'disruptive innovation'[3] in concert with other actors in national life.

Very recently, universities in Britain have started facing a financial crunch and have resorted to getting help from the bond market and other private sources to attract funds. In most developing countries, the situation is, however, far more serious: overpopulation along with low spending on health and education has adversely affected the quality and performance of universities. They have been reduced to mere pedagogical places (award of degrees and diplomas for seeking employment) rather than incubators of invention, innovation and skill-based economies.

The study examines the varied challenges that universities are facing in the fast-changing world, especially in the Islamic world and Pakistan. Albeit financial resources remain a fundamental issue, yet more importantly, knowledge-and-skill-based economies need to employ multi-vector strategies. In other words, the Triple Helix strategy, incorporating industry-academia-government, is essential for sustained national development. Notwithstanding the immense challenges, a phased paradigmatic shift could catalyze the centres of learning and research and thereby contribute to national development.

Universities in the Islamic World: An Overview

The Islamic World is hardly monolithic: there are countries with relatively developed educational systems (Malaysia, Turkey, some Central Asian Republics, Iran, and Egypt) along with those which are extremely poor (Somalia, Mali, Afghanistan, Upper Volta, and Chad). Significantly, many states of the Muslim world fall into the category of the 'Fourth World' rather than the Third World. The former are characterized by low population, scarce resources, and deficient technical manpower. Pakistan, a Third World developing country, is a nuclear power and possesses adequate technical manpower, relatively better infrastructure and linkages with the West; yet its universities and educational levels leave much to be desired.

The total number of universities in the Muslim world (nearly 674 or so) is less than Japan alone. The appalling fact is that due to fragile and poor economies, most of these Islamic governments are inept, ill-equipped or ill-motivated to improve their educational sectors. Mal-administration, lack of merit and distorted priorities are other factors that contribute to the educational malaise. In the Muslim world, including Pakistan, (and barring few exceptions like Malaysia) politics tends to trump health and educational issues. But the nations that have lifted themselves out of ignorance, poverty, and dependence in the span of a few decades have prioritized education, especially higher education. Presently, acute socio-

[3] Dr. Athar Osama, "Why education is ready to be disrupted," *The News,* International, 16 April 2014, 6.

economic turmoil, poverty, poor education and ill-health create a lethal mix.

Education is a *sine qua non* for any sustainable socio-economic development. While it may not engender quick and immediate results, its long term dividends are undisputed. As stated by Harvard scholar, Joseph Nye Jr., a strong sovereign nation needs components of 'hard power' coupled with elements of 'soft power' to transform itself into a 'smart power.'

Ideally, universities should be houses of learning, knowledge, innovation and high-quality research; besides promoting high quality and state-of-the-art education and research methodologies, they should assist in the overall national growth and development through research, innovation, and linkages with industry. Moreover, they ought to be emblems of national pride and the soft power of a nation.[4] These should mark their ranking status[5] to attain global attention.

However, universities do not and cannot operate in a vacuum. They need to collaborate with government and industry in building safe and prosperous communities that contribute to the uplift of the society and nation. Further, universities can act as engines of research, innovation and national growth. Today, the traditional function of merely producing graduates with degrees and diplomas is getting outmoded, if not obsolete. Now, universities are expected to play a pro-active, innovative and robust role in national development by providing skill-based knowledge to youth in diverse fields. This has become more significant in view of the major CPEC (China-Pakistan Economic Corridor) project signed in April, 2015.

Historically, since the 19th century, the university-industry nexus has existed in multiple forms in the West. While the need has been well understood and greater spending is allocated to R&D, the realization is now slowly but surely growing in the developing world too. More specifically, university-industry-government triangular collaboration is an important part of the paradigm shift for national development. In addition, defence forces as disciplined and well-endowed institutions can form an important component in this triangular tie-up.

Universities in Pakistan

According to a recent Quackquarelli Symonds (QS) rankings report, none of over 150 Pakistani public and private universities have been able to qualify for inclusion in the top one hundred universities in

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4 On qualities of a good university read Dr. Hameed Ahmad Khan, *N.I.* Adviser, Physics, COMSATS, Chapter 6, "Creation and Dissemination of Knowledge: Role of Universities," in *Universities in the Islamic World* (COMSATS: Islamabad, July 2014), 41-54 [Unpublished].

5 Dr. Noman Ahmed, "Getting university rankings right," *The Express Tribune*, Islamabad, June 16, 2014, 6.

Asia.[6] In the past few years, the Higher Education Commission's (HEC) budget has been considerably axed and funding for universities has been truncated. In fact, poor funding and misplaced priorities have hit the education sector, in general, and universities, in particular. No wonder, illiteracy is directly correlated with militancy and terrorism in many Muslim societies.

Pakistan has a low literacy rate of 30 percent. According to the UN Report for 2012-2013, its ranking is 146 amongst 187 countries.[7] In the FY 2013-14, the national budget for education was 1.9 percent of the Gross Domestic Product (GDP) and 8 per cent of total expenditure.[8] If allocation to research is computed, the figure plummets further below.

Tellingly, Pakistan's education expenditure is the lowest in South Asia. It is less than its South Asian peers, such as, India and Nepal who spend 3.3 and 4.7 percent of their respective GDPs on education.[9] Low allocation is not the only issue, as during 2012-13 the actual expenditure on education was merely 50 percent of the allocated amount. On average, 82 percent of the allocated funds are spent on non-development items.[10]

According to UN requirements, the budget earmarked for education should be a minimum of four percent. Some experts, however, recommend at least 10 per cent allocation for the next decade or so (like Indonesia and Cuba) to free societies from the albatross of illiteracy, poverty, and ill-health, which act as serious impediments to national growth and development.

Policy Recommendations

In view of the foregoing, some practicable policy guidelines (initially generic and later specific) are offered. Policy recommendations tend to be mostly idealistic in nature but the test lies in realistic conception and faithful implementation. As the saying goes, the "devil lies in the details."

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6 See "HEC warns against nepotism in varsities." *The Express Tribune,* July 10, 2015, 13.

7 According to the above report, Bangladesh stands at 145, India 134; and Sri Lanka 97 out of 187. The budget allocation for 2013-14 is 0.8 per cent of GDP and 1.8 percent for health which makes Pakistan as the Least Developed Countries (LDCs) in the world. See Editorial, "Education—An Ignored Orphan," *Frontier Post,* Peshawar, June 8, 2014.

8 "Provincial issue: Education is a concern but only on paper," The allocations province wise on education (2014-15) are: KP 27 percent, Punjab 26 percent, Sindh 21 percent and Baluchistan 13 per cent respectively. See *The Express Tribune*, Islamabad, June 23, 2014, 15.

9 Marc-Andre Franche, "Making education work in Pakistan," *The Express Tribune*, June 26, 2014, 7.

10 Ibid.

Following the best practices

It is increasingly realized that for developing countries such as Pakistan, a model based on South Korean economic growth may be relevant. After all, Pakistan, in the heydays of national growth in the 1960s, set a model for economic development which Korea borrowed and adapted effectively. Presently, Korea's Planning Commission uses a composite plan with three components: (i) good quality education; (ii) highly technical institutes in fields of relevance; and (iii) interaction with industry. This plan produces good quality graduates with hands-on experience in high-end technologies. Already introduced to industry and institutes before graduation, they are readily absorbed in industry and businesses.

The University of Science and Technology (UST) in Korea was formed out of a group of public universities and research institutions. Established in 2003 by the Korean government as the nation's graduate school specializing in science and engineering education, it is one of the top science and technology universities. The graduate students must spend one year at one or two of these institutes. Likewise, in advanced countries where higher generation technologies exist in the industry, students take up their final year projects in specific industries/firms. Even otherwise, the industry selects good students from universities and gives them on-the-job-training by giving internships. So, the countries that have high-end industries are already on the road to high-value addition, thus posting higher exports and raising national revenues.

University Leadership

Ideally, the university should be headed by a respected and renowned scholar who is a competent administrator with a committed, visionary, progressive and entrepreneurial outlook. Political appointments, unmerited, are the curse of all institutions, thereby sapping academic vitality. A competent head with solid linkages to industry, technical centres, foreign institutions, the defence establishment and the government is essential in galvanizing the university system. In other words, effective leadership with a motivated, competent staff is an asset for the organizational health and progress of a university.

Academic Freedom and Autonomy

To effectively undertake diverse education-cum-social programmes, a university must commit to the spirit of truth and possess academic freedom and institutional autonomy. Key duties of universities, academics and administrators include fair play, advancing public good and being transparent and accountable.

Funding Issues

With the overall economic crunch hitting nationally and globally, attracting resources has become a crying necessity. Many Western/US universities increasingly expect their Presidents/Rectors/ Vice-Chancellors to act as fundraisers too, in addition to their normal duties. The head should be blessed with qualities of head and heart, experience, persuasion and the skills of a progressive entrepreneur. As the government budget progressively shrinks and the HEC budget is axed, sources of funding for Pakistani universities have considerably diminished. Therefore, in order to mobilize and generate funds, the universities have to conjure up bold, creative and innovative methodologies.

Pakistani people are generally quite altruistic by nature. If and when an emergency occurs (natural or man-made), they have little hesitation in donating generously for noble causes in the form of charity and grants. Unfortunately, the cause of education does not elicit a similar response as it does in the West, where the setting up of dedicated chairs, donations, and endowments are common. If education can be turned into a national cause through a national emergency, it would galvanize the university system.

As difficult times in the Islamic world are likely to persist in the foreseeable future (till economies stabilize and political stability returns), the universities will have to think anew and ponder how to become autonomous and self-sustaining in financial matters by generating their own funds. Challenging though it may seem at present, it is not entirely an impossible task.

Short-term Measures

Besides regular teaching, evening classes/training courses/ workshops with suitable fees could be offered. These could be in civic education programmes, basic engineering skills, secretarial services, basic computer skills, project designing, proposal writing, resume writing, speech training, building social and conflict resolution skills, interviewing, relaxation and stress-coping techniques, language workshops, and creative writing skills; they could also include workshops for civil service exams, as well as diploma courses for overseas workers like plumbers, carpenters, motor mechanics, masons, telephone operators, electricians and refrigerator repairmen. In addition, drivers, gardeners, and medical attendants could be trained with expertise available from within the universities. The wish list may seem ambitious but the staff earmarked for training can be drawn from the university pool by giving them financial incentives for this extra work.

Medium/Long-term Measures

As is the practice, some Western universities have set up small businesses on campus such as small malls, modest business complexes, conference/lecture halls, properties for leasing and small farms for generation of revenue, etc. The incubator centres in some universities are a welcome step and a good trend setter. Such measures could generate extra income which would make the universities less reliant on their governments. In addition, the latter could establish small hospitals, undertake on-campus cleanliness campaigns, perform guard and on-campus duties by students, own parks/trees – thus saving cost. These could be combined with visiting SOS villages/orphanages/old homes and charity walks on a voluntary basis during vacation.

Granted, the above tasks are not meant to be performed by the universities alone; civil society, government, and the press have to play an equal part. But foreign universities have now developed the concept of evening classes/distance learning and devising special workshops on a range of practical subjects to generate their own funds. Besides generating extra finances, they provide the needed skills/training to those who have been unable to attend regular education in their lifetime. These could be senior citizens (men and women); young people interested in changing careers; retired people and those desirous of keeping themselves meaningfully occupied by learning new skills or contemplating new ventures in life.

Hard and Soft Sciences

Economic growth and technological prowess are important, yet are hardly enough for national development. Science and humanities as subjects are not mutually exclusive, as commonly thought. In raising a balanced, humane and socially vibrant citizenry, hard and liberal sciences are important for building a balanced national psyche. As an example, most Western countries such as the USA, Britain, Germany, France, and Spain have achieved remarkable scientific prowess with a combination of social sciences and liberal arts. Presently, the Vice Chancellor of Oxford University is a woman qualified in International Relations — selected for the first time from the social sciences.

Capacity Building: Issues of Retention and Frequent Turnover

The bane of many universities is in attracting merit and preventing frequent turnover of teaching staff. The causes for the turnover are multiple: unsatisfactory wages and incentives; lack of proper working conditions; improper procedures and inadequate system of rewards and promotions. This results in a politicking culture which has taken a toll in most Pakistani national institutions. It can be minimized by streamlining rules and procedures and offering incentives. 'Brain drain' is an issue, but

this can be controlled by offering financial inducements, adequate research grants, and merit-based placements. The HEC has done a commendable job in the past few years but needs to be improved and sustained in future.

Tapping the Youth Bulge

It is essential to unleash the creative talent of the Pakistani youth. Nearly 90 million youth are below 19 years of age and constitute 54 percent of the population. This huge demographic resource needs to be harnessed, from low-level agriculture to value-added agricultural economy and to a knowledge-based economy through the creation of skilled workers. There is a need to build this human workforce in addition to an infrastructure of roads, buildings, dams, and highways.

Harnessing the Pakistani Diaspora

In this regard, effective and special taskforce committees can be formed for technology transfers and R&D to explore creative and innovative methodologies, maintain linkages with university alumni and tap the Pakistani diaspora. The diaspora should be engaged for technological entrepreneurship by innovative firms with TNCs for technical transfers and R&D. For this, close coordination with foreign embassies, foreign universities and financially well-endowed Pakistanis is important. It is worth noting that diaspora networks have sustained the Taiwanese and Indian computer and IT industries respectively.

Community and Civic Engagement

Universities need to proactively engage with societies at the intellectual and cultural levels and contribute to the development of a conscious citizenry. As part of advancing the public good, universities engage with the public and serve as catalysts in public education and intellectual debates. Through social commentary and critique, universities may shape world views and ideas, social relations, institutions, and practices. Besides, they can design more creative strategies to facilitate proactive, critical and thoughtful engagement with the public. Through learning and scholarship, they can develop an understanding of social and economic problems, and contribute to redressing them. Thus, community engagement/service-learning can connect universities and communities for a mutually beneficial learning-service relationship.

The community or civic engagement encompasses community outreach, student and staff volunteer activities and 'service-learning.' The latter engages students in community activities where both community and students benefit. This reciprocity integrates community service with scholarly activity. It would necessitate a curriculum re-design, revamping teaching methods, learning and assessment and new methodologies for knowledge production and research. For this, specific disciplines may have

to reshape the form and content of community engagement and vice versa.[11]

Employing 'Disruptive Innovations'

According to a physicist, Muslim nations are not doing much fundamental research, having focused more on experimental sciences. There is a need for value addition, spending time with entrepreneurs, emphasizing work done in laboratories, and adapting new generation technologies such as super-computers, food and bio-technology, and nano-technology. Besides, planning and implementation in policies on university-industry linkages are crucially important, as South Korea has vividly demonstrated.[12] Shifting from low value-added agriculture to a knowledge-based economy, nano-technology, bio-informatics, genomics, effective linkage of university with industry, tapping the technical and professional diaspora, creation of technical parks, and incentives for the private sector to undertake R&D are some of the means to improve the quality of universities.[13] By means of "disruptive research",[14] it would be possible to lift the academic/technical level of universities.[15]

Good Governance in Universities

The impact of educational investment and allocation of funds should not be considered as a simple linear function of inputs and outputs. This applies equally at the university and national levels. The entire process by which outcomes are positively accrued needs to be addressed: emphasizing good governance viz. performance benchmarks, a system of monitoring and accountability, and a revamping of accounting and budgeting formulae for the allocation of funds. The system should go beyond the criteria of apportionment of funds, student enrollment, results etc.

Performance should be judged at different levels through online systems, like those instituted in Mexico and Colombia in providing regular updates to decision makers.[16] In this regard, statistical and data collection systems have to be continuously updated for providing accurate and

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11 On this see Mr. Ghulam Haider, Adviser, "Service to Society: Role of a University," Chapter 3, in *Universities in Islamic World* (Islamabad: COMSATS, July 2014), 34. [Unpublished].

12 Dr. Mansoor Baig, N.I., talk at *Adviser's Forum,* COMSATS, June 16, 2014.

13 Atta-ur-Rahman, "Budgeting for a knowledge economy."*The News,* International, May 31, 2014, 7.

14 Dr. Athar Osama, "Why education is ready to be disrupted," *The News,* International, 16 April 2014, 6.

15 Atta-ur-Rahman, "Budgeting for a knowledge economy."*The News,* International, May 31, 2014, 7.

16 Marc-Andre Franche, "Making education work in Pakistan," *The Express Tribune*, June 26, 2014, 7.

updated information to policy planners.[17] Encouragingly, the Pakistan government is thinking upon similar lines in its Vision 2025 Plan, and the Five-Year Plan.[18] Universities have done so well in Singapore, Malaysia, and South Korea and it is a tribute to their visionary leadership and forging of strong linkages between the university and industry. They have been able to create a knowledge-based economy. Through skilled employees and linkages with international companies in electronics, engineering and petrochemicals, there has been a significant rise in their GDP.

Tri-lateral Collaboration of Academia, Government and Industry

It is being increasingly realized that there should be meaningful cooperation between academia, government, and industry. Since the 19th century, the university-industry nexus has existed in the West in multiple forms. While the need for this phenomenon has been well understood and greater spending is allocated for R&D in the West, this realization is slowly but surely emerging in the developing world. More specifically, university-industry-government triangular collaboration is an important part of this development process. Defence forces, as disciplined and well-endowed institutions, can also form an important component of the government in the tie-up.

For a meaningful role of universities, the private sector and businesses have to join hands. R&D leads to a knowledge-based economy. It is essential to cater for local conditions through innovation, value additions, industrial competitiveness and diversifications to add to economic growth. Presently, the share of private R&D over public R&D has grown substantially. For example, business R&D accounts for a total of 70 percent in China, 68 percent in the US, 75 percent in Korea, and 70 percent in Germany.[19] By contrast, Pakistan's share of R&D is only 0.64 percent as compared to 0.8 percent of the GDP. Out of the earmarked R&D, 60 percent is spent on defence and the rest is for research. Besides, the R&D activity is inhibited due to lack of tax incentives and paucity in tax grants. Hence, there is a need for business incubation centres, technology parks and legislation for the protection of proprietary rights. Development hubs can be established around industrial zones and universities can then be brought into the loop.

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17 Ibid.

18 Ibid.

19 See Dr. Atta-ur-Rahman, "Building a Knowledge Economy: Imperative for Socio-Economic Development," *IPR Report,* Institute for Policy Reforms, August 2015, Lahore, 15.

For streamlining the process, it is felt that the Triple Helix[20] model could be applied with suitable modifications to local context. The concept assigns a major pro-active role to universities in invention and innovation besides industry and government. The university becomes pivotal as far as collaborative relationships between the three major components viz., the academia, government, and industry are concerned. Resultantly, the innovation policy becomes an outcome of a spiralling relationship rather than a prescription from the government. The three aforesaid entities, in addition to fulfilling traditional functions, also take on the role of one another. In this way, they can assume additional new roles. Institutions at the forefront of taking on such non-traditional roles are expected to become a major potential source of innovation.

The recent version of the Triple Helix system of innovation was enunciated by Ranga and Etzkowitz in 2013.[21] It synthesizes this interaction into an 'innovative system' format which is based on the systems theory as a set of component relationships and functions. According to this approach, the Triple Helix components are categorized as follows: R&D and non-R&D innovators, single-sphere and multi-sphere (hybrid) institutions, and individual and institutional innovators. It revolves around the concept of the Entrepreneurial University which takes a lead role and puts existing knowledge to use proactively in creating new knowledge.[22] It envisages an interactive rather than a linear model of innovation. The government is expected to act as a public entrepreneur and venture capitalist, in addition to performing a regulatory role. As universities develop a web of links, they can combine relevant parts of the intellectual property and jointly exploit them. Thus, innovation is no longer considered as an Intra- or Inter-firm process; rather it is an activity that involves institutions not originally thought like the university-government linkage. Thus the university takes upon itself the 'third mission' of involvement in socio-economic developments, in addition to teaching and research. Some contemporary researchers have also developed a Quad version of the model which highlights the possible role of civil society as an active partner in the process.[23]

The collaborative links help enhance the role of universities in the production of scientific research. Presently the entrepreneurial university is expected to exhibit an enhanced capacity to provide students with new ideas, skills, and entrepreneurial talents. Further, it consciously trains and encourages students to become entrepreneurs and founders of firms

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20 Portions of this section on Triple Helix model are extensively drawn from an excellent piece by Engineer Syed Tanveer Abbas Jafri, "Universities of the Islamic World: Leveraging the Triple Helix," Chapter 9, 71-84 in *Universities in Islamic World* (Islamabad: COMSATS, July 2014), 34. [Unpublished].

21 Ibid., 74.

22 Ibid.

23 Ibid.

through interventions like the introduction of entrepreneur programmes and the establishment of entrepreneurial cells.[24]

Additionally, entrepreneurial universities are engaged in the process of reaching out and educating organizations through entrepreneurship and incubation programmes like interdisciplinary centres, science parks, academic spin-off incubators, and venture capital firms. Focused entrepreneurial universities have been able to generate technology that has leveraged their profile as a new source of technology generation and transfer. In other words, they no longer merely serve as founts of seminal concepts of existing firms but produce new formats combining research and teaching as a source of new firm formation, especially in advancing science and technology.

Role of Academia

In fact, it is worthwhile for universities to engage focal persons who are well-versed with bureaucratic idiosyncrasies, along with a knowledge of the potentials of various government organizations vis-à-vis innovation and entrepreneurial activities. Such persons, with a public-sector-oriented skill set, can successfully liaise with the government and its organizations.

The establishment of 'units for policy studies' and holding frequent academia-government dialogue and joint events can be useful in moulding government thinking into an innovative and facilitative mode. In fact, interventions aimed at incorporating relevant elements in Science and Technology policy should be at the top of the university agenda.

A Triple Helix Forum may be established in Pakistan and leading universities in the Muslim world along with entrepreneurial cells, with each university building on their peculiarities and strengths. It is noteworthy that universities which have made their mark as successful entrepreneurial universities at the global level are primarily those who have systematically implemented the Triple Helix model.

Another intervention in Pakistan was when a number of universities established ORICs (Office of Research and Innovation Centres) in accordance with guidelines of the Higher Education Commission. In some cases, such units have been able to bring about positive linkages with industry; however, not much meaningful interaction appears to have taken place vis-a-vis the government. ORIC can act as a readily available focal point for Triple Helix-related interventions in Pakistan. Here, some philanthropists and civil society organizations are active in supporting socio-economic causes. Such sectors of civil society can be leveraged by entrepreneurial universities for the provision of Vice Chancellor funds and solicit support for impacting National Science and Technology policies.

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24 Ibid., 74-75.

Role of Government

In Pakistan, like other Islamic countries, the typical hierarchal bureaucratic structure of government tends to inhibit innovation and non-linear interaction. Unfortunately, the bureaucratic mindset prevails in the industry as well as in academia. As such, any interventions made by the university need to be cognizant of the peculiar mindset of bureaucracy.

In the context of the Triple Helix model, the government refers to all tiers of the government and its agencies. This includes organizations involved in policy making in the scientific domain and entities pertaining to education, R&D, standardization, patents, intellectual property, and innovation. It starts with Science and Technology policy formulation and evolving innovations, and culminates in the patenting of products or protection of intellectual property, in one way or another, connected to the government.

Formulation of a facilitative Science and Technology policy is the pivotal first step with regard to innovation. Such a dimension appears to be lacking in the policies of many developing countries. As such, one of the formidable tasks facing academia is influencing all entities whose input goes into such policy formation. These include R&D, productivity and intellectual property-related organizations in the public sector, as well as, senior bureaucrats, legislators, and ministers. Result-oriented relationships with such organizations require a focused approach by the academia. Interaction with the government may require the ability to navigate through the red tape of egoistic bureaucrats and layers of rent seekers. Relevant communications skills and structured interaction with such organizations may be optimized by the academia through the use of focal persons who possesses a special skill set.

Role of Industry[25]

In Pakistan, the university-industry collaboration has been limited to certain selected sectors, such as bio-technology, pharmaceuticals and, to some extent, engineering. Industrialists and businessmen are typically looking for huge margins and quick returns. Generally, funds allocated to training or R&D by such private organizations are minimal. The trend is to continue 'milking the cash cows' and not be innovative.[26] Such an attitude may help generate revenues for the time being but not in keeping with the long-term vision of the firm.

There is a dire need to sensitize industry with respect to the gains which can be made from a spiralling Triple Helix relationship between industry, government, and academia. Best practices and success stories

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25 Aziz Ahmed Qureshi, "Role of Universities in the Industrial Development," Chapter 2, 9-16. Adviser, Department of Physics, Universities in the Islamic World (Islamabad: COMSATS Institute of Information Technology, July 2014), [Unpublished].

26 Ibid.

from developed countries may have to be showcased. To start off, innovation-prone sectors within industry and business may be targeted by the academia. Joint projects and incubation activities need to be stepped up by keeping relevant government entities in the loop. Focused showcasing can be helpful in promoting promising products/projects to attract venture capital from industry and government.

The industry/business scenario in Pakistan has undergone a rapid change during the last three decades. The de-nationalization of major industries and units, after nationalization during the regime of ex-prime minister Zulfikar Ali Bhutto, is going on and the majority of such units stand privatized with businesses thriving in some of the relevant sectors. For instance, the banking sector has been doing well which was followed by banking reforms. Currently, there are a large number of multinationals active in various sectors ranging from petroleum/energy and telecom to consumer goods. These have contributed a lot in generating progressive business and industrial trends. However, the multinationals have been shy so far in involving Pakistani universities. More often than not, beneficiaries of incubation activities tend to be home countries of multinationals. The business culture stands radically transformed in Pakistan and some of the family dominated conservative industrial groups have become risk takers; the offspring of such businessmen are business savvy, having received education from abroad. They are thus more likely to experiment with new and creative ideas.[27]

Some sectors of the Pakistani economy are less prone to innovation, while others are ready to foster innovation and develop new products. The former category includes mature sectors with low technological content such as commodities, textiles, and autos, whereas the activities of small and medium enterprises and the engineering and telecom sectors fall into the latter category.

In developing countries, local businessmen may be either small or big family-owned enterprises, small/or medium enterprises run by local professionals, with multinational corporations dominating the more lucrative sectors. However, on the whole, one has to bear with opportunistic and quick return-seeking industrial and business entities. Such entities are not much interested in R&D, product improvement or innovation and may be indifferent towards innovation and content, with current profits being made on standardized products. On the other hand, multinationals are more likely to outsource their research projects or innovative interventions to academia in their countries of origin generally in the West. Innovative Pakistani universities can start a meaningful dialogue with such entities with a view to retaining such projects and activities at home.

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27 Ibid.

The above scenario demands a multi-pronged approach by the academia. This may have to be customized on a sectoral/organizational basis. It may be worthwhile, initially, to target the innovation-prone sectors like ICT and FMCG.[28] The academia may also have to come up with interventions aimed at creating awareness through training programmes for local businessman and exposure of local creativity and expertise to MNCs operating in the country.

Incubation activities by Pakistani and Islamic universities will have to be enhanced to a level whereby the products are incubated to a degree that immediate commercialization is visible. That means that innovation-shy industries will be willing to take some risks. The academia will also have to actively build a consensus with industry and government on all relevant issues and policies.

Conclusion

The concept of a modern university is the ability to connect with academia, industry, and government for national growth and development. In Pakistan, like other developing countries there is negligible interaction among the trio: university, industry, and government. Often they work in a segmented fashion while protecting their turfs and boundaries. This marks an inventive and innovative spirit and hence very few can be qualified as 'entrepreneurial universities.' Pakistani and universities in other Islamic countries need to focus on the benefits of employing a modified version of the Triple Helix concept. The relationship has been highlighted as technology transfer, collaboration and conflict moderation, collaborative leadership, and partial substitution of roles and networking.

The overall function of the Triple Helix system of knowledge is realized through a set of activities in knowledge, consensus and innovation spaces. Organizations can utilize this explicit framework for a systematic leveraging of interaction between actors. This also helps develop circulation of knowledge flows within and among spaces, thereby assisting and identifying existing gaps or blockages. Lately, the concept of "disruptive innovation" is also in vogue to jumpstart national growth and development. A consolidation of space and increasing non-linear interaction between different actors can positively impact the theory and practice of innovation. In addition, the model highlights the important additional roles and activities of an aspiring university. These include activities aimed at impacting relevant policy, engaging focal persons to reach out to government entities, exploring venture capital avenues, supporting incubation activities, involving civil society, engaging in

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[28] Syed Tanveer Abbas Jafri, "Universities of the Islamic World: Leveraging the Triple Helix," Chapter 9, 71-84 in *Universities in Islamic World* (Islamabad: COMSATS, July 2014), 34. [Unpublished].

dialogue with industry, and attempting to reach consensus among stakeholders.

Needless to say, an ill-educated nation can become a liability and turn into a haven for socio-economic and politico-cultural pathologies. The current malaise of militancy and terrorism in Pakistan and the Islamic World is directly correlated with the abysmal state of education in schools, colleges, and universities. This, of course, is allied with shoddy governance and accountability. Here it would be apt to honour the late Dr. Mahbubul Haq's ardent wish before his demise that allocation to social services (education and health) in Pakistan be increased to 10 percent of the GDP.[29] If this is done, it would help improve national 'soft power'[30] along with 'hard power' in which universities could act as agents of change. In view of the ongoing major CPEC project and other future developmental endeavours in Pakistan, the need for tripartite university-industry-business linkages is all the more compelling: the lessons learnt from one venture could be suitably modified and adapted to others in national development.

[29] See U.A. Malik, "Remembering Mahbubul Haque and his work," *The Express Tribune,* 19 July 2014.

[30] On the role of 'soft power' read Maqsudul Hasan Nuri, "Promoting Pakistan's Soft Power: Challenges and Opportunities," "Building Multi-Dimensional Security in the Islamic Countries,"6th Think Tanks Forum of The Islamic Countries, Istanbul, Turkey**,** held at Serena Hotel, Islamabad, 6-8 March 2015.