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Mehran University of Engineering & Technology, Jamshoro

Proceedings of

International Workshop on

Entrepreneurship Technology, and Institutional Sustainability in Higher Academia



Partnering Universities:



Reflections

Experts belong to higher academia, industry research and development organizations, corporate sector, civil society and government officials agreed on that the success and sustainability of higher educational institutions in Pakistan is unified with Entrepreneurship, Technology Transfer and Venture Commercialization.



We need to learn from best practices being followed by the leading research universities with regard to demand-driven technology development and commercialization.

Prof. Dr. M. Aslam Uqaili,
Vice Chancellor MUET.

Universities have to play a vital role to deploy a "triple helix model" to strengthen the academic-industry-government relations.

Senator Nisar A. Memon,
Former Federal Minister of Information &
Chairman Water & Environment Forum.



Universities have to do tremendous job to develop the talent of the students to transfer ideas into opportunities rather to get them reproduce the answers of five questions in examinations.

Dr. Ishrat Hussain,
Dean/Director IBA Karachi &
Former Governor State Bank of Pakistan.

Universities of Pakistan may take following actions to initiate the process of technology commercialization. 1) Develop Intellectual Property Policy (IPP), 2) Encourage faculty to invent/disclose, 3) Develop and execute process for evaluating disclosures.

Mr. James Thompson,
Director, Technology & Venture Commercialization Office,
University of Utah.



Executive Summary

In a competitive global environment, it is now impossible for universities to succeed or prosper without changing their orientation towards entrepreneurship and innovation. However, developing countries continue to struggle in this regard because of the absence of the necessary institutional arrangements and faculty incentives.

Aligned with the objectives of U.S.-Pakistan Center for Advanced Studies in Water (USPCAS-W), the center in collaboration with Mehran University of Engineering & Technology (MUET), University of Utah USA and Pakistan Science Foundation (PSF) jointly organized a one day International workshop on "Entrepreneurship, Technology, and Institutional Sustainability in Higher Academia".

The workshop was held on 19th December 2015 at Karachi. The workshop provided an opportunity to the stakeholders from industry, business community and academia to exchange ideas on the subject and discuss options for taking forward the concept of technology commercialization in the higher academia. Another important objective of the workshop was to bring together all the stakeholders drawn from the government, industry and academia on one platform to create an effective relationship and later on partnership for the long-term transformation of research into venture commercialization in the country. Experts, in the workshop, agreed that the success and sustainability of higher educational institutions in Pakistan is unified with Entrepreneurship, Technology Transfer and Venture Commercialization (TVC). The forum agreed on various initiatives, given in the report as workshop recommendations, which provided a way forward to initiate the process of technology commercialization.

It was suggested to establish a working group, comprising of representatives from Academia, HEC and Industry to follow-up with the recommendations of the workshop.

Valuable presentations made during the course of workshop are contained as annexures of the report.

The Context

A profound change has occurred in recent years in the funding model of tertiary educational institutions around the world. In the past, universities relied mainly on three non-competitive sources of funds: tuition, direct budgetary grants from government, and donations from alumni. Today; increasingly, there is a shift towards more competitive sources, especially competitive research grants from governmental as well as non-governmental sources, profits from research activities, and technology commercialization. This is the result in part of the rise of what has been called the knowledge economy, and in part a shift in governmental ideologies towards more market-based approaches. In a competitive global environment, it is now impossible for universities to succeed or prosper without changing their orientation towards entrepreneurship and innovation. However, developing countries continue to struggle in this regard because of the absence of the necessary institutional arrangements and faculty incentives. In Pakistan, this transition has been slow to take off. While there is a response to competition for research grants from national or external sources, there is very little activity in the area of research or technology commercialization. In part, this is the result of a conservative approach towards innovation, which relies performance on the availability of adequate financial or other resources before embarking upon an untested course of action. In contrast, much of the upper tier of universities in the world has switched to an entrepreneurial mode of action whereby the approach is to leverage available resources into profitable and thus resource-generating activities. Many universities have established research support programs, incubation centers, or venture capital opportunities for their constituents in order to benefit from tripartite (government-business-academia) collaboration (see Etzkowitz 2000).

In a competitive global environment, it is now impossible for universities to succeed or prosper without changing their orientation towards entrepreneurship and innovation. However, developing countries continue to struggle in this regard because of the absence of the necessary institutional arrangements and faculty incentives.

The workshop was aimed at initiating a process of reflection leading towards institutional reform in Pakistani universities in relation to integrating the technology commercialization or technology & venture commercialization, known as TVC. It builds upon a collaborative framework established under the aegis of the USAID funded project to build Centers of Advanced Studies in water, energy, and food at four selected Pakistani universities. One of the goals of this collaboration is to enable the adoption of best practices in university operations from US universities to their Pakistani counterparts.

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The Partners

MUET – Mehran University of Engineering and Technology:

MUET one of the leading technical universities in Pakistan. Among its distinguishing features; one is the establishment of the “Mehran University Institute of Science Technology & Development (MUISTD)” and the other is setting up the directorate “Office of Research, Innovation and Commercialization (ORIC)”.

MUISTD – Mehran University Institute of Science & Technology Development:

MUISTD aims to apply a cross-disciplinary approach to the support of engineering education. It is established to be a center of excellence for teaching, training and research required to respond to the modern day challenges. Its R&D activities are aimed at focusing on all important issues relating to development, management, and exploitation of human & natural resources and other means & methods for rapid socio-economic development of the country. It is intended to serve as a nerve center and render suitable advice for the required scientific and technological development to academics, research, industry, business, government, etc.

ORIC Office of the Research Innovation and Commercialization:

The ORIC is to provide strategic and operational support to the university's research activities/programs, and play a principal role in facilitating the university's research outcomes; focusing mainly on transformation of invention (pure Knowledge) into innovation (products and production processes) which ultimately have an impact on the community welfare as a whole.

PSF Pakistan Science Foundation:

PSF aims at promoting and popularizing science for socio-economic development. Its vision is to; i) Create culture of inventions and innovations, ii) Advance science and technology to accelerate socio-economic development and iii) Motivate youth towards career in science through a variety of viable science popularization programs.

TVC

Technology & Venture Commercialization Office of University of Utah:

TVC one of the leading public sector universities in the United States. One unique feature of UU is the early attention to research management and technology commercialization. This includes the establishment of the Technology and Venture Commercialization Office (www.tvc.utah.edu) in 1968. Today, UU ranks among top of the list of universities in terms of research patents and start-ups. In 2014, TVC generated revenues of \$30 million for the university through royalties, profit sharing, and fees.

This workshop was organized by the US-Pakistan Center for Advanced Studies in Water (USPCASW), MUET with the support and active collaboration of the University of Utah, especially the Technology & Venture Commercialization Office. In addition, support had also been solicited from other four entities, the **Pakistan Science Foundation**, the **Institute of Business Administration (IBA), Karachi**, the **Intellectual Property Organization (IPO)**, Government of Pakistan and MUISTD.

Genesis of TVC in Pakistan¹

In 2003, the Governments of Pakistan and the United States signed a comprehensive Science and Technology Cooperation Agreement that established a framework to increase cooperation in science, technology, engineering, and education for mutual benefit and peaceful purposes. In 2005, USAID-Pakistan along with the Higher Education Commission (HEC) and the Ministry of Science and Technology (MoST) began funding cooperative activities under this agreement with the Department of State (DOS) joining as US co-sponsor in 2008. On October 23, 2013 the S&T Agreement was renewed by both countries until 2018. The program aimed to strengthen capacity of Pakistani public and private science and technology institutions by;

- ❑ Enhancing the ability of Pakistan's science and technology community to spur human and economic development;
- ❑ Improving the quality, relevance, or capacity of education and research at Pakistani institutions of higher education in the field of science and technology;
- ❑ Improving the capacity of Pakistani research institutions to support industry competitiveness.

To highlight a new program focus on commercialization and innovation in research, the first Pakistan – U.S. Science and Technology Program Symposium on Economic Growth was held in Islamabad, Pakistan in January 2013. The symposium brought together scientists, entrepreneurs, government officials & media and discussed diverse topics such as forming university technology transfer offices, to composing elevator pitches, to intellectual property rights, and forging public-private partnerships.

¹Fact Sheet on Pakistan – U.S. Science and Technology Cooperation Program

Objectives of the Workshop

Key objective of the workshop was to initiate a dialogue among academicians, business community, legal experts, and entrepreneurs to produce viable recommendations for addressing the existing barriers to entrepreneurship, research, technology, and venture commercialization in Pakistani Universities.

It also aimed at exploring some basic but key questions which serve as path to institutional sustainability through strengthening academia-industry linkages. These questions were;

- 1 What is a commercialization strategy?
- 2 What are the challenges in commercialization of technologies in Pakistan?
- 3 How can or have entrepreneurs overcome these challenges?
- 4 How to promote an entrepreneurial attitude towards research?
- 5 What possible sources of funding could be accessed?



The workshop specifically focused on sharing and learning of experiences relevant to creation of an enabling environment for technology commercialization. Finally; the workshop was part of the broader thinking to examine technology commercialization and transfer issues to promote socio-economic development on the one hand, and to secure institutional sustainability of upper tier research universities, on the other.





Proceedings of the Workshop

Session – I: Welcome and Introduction

The session was chaired by Senator Nisar A. Memon, Former Minister of Information and Chairman Water & Environment Forum. Distinguished guests spoke on the occasion were; Dr. M. Aslam Uqaili, VC MUET; Dr. M. Akram Sheikh, Member (Science), PSF; Mr. M. A. Jabbar, Former Vice President, FPCCI; Dr. Steve Burian, Director USPCAS-W, UU and Dr. Bakhshal Lashari, Director USPCAS-W, MUET.

Welcome Note by
Prof. Dr. M. Aslam Uqaili,
 Vice Chancellor MUET

In the journey of innovation and knowledge transfer, higher education institutions around the world are seen as the main partners of industries and business organizations. Many of us now see the problem of technology development and transfer as a much broader issue than we did a few years ago. We believe that the concepts of commercialization, generation of demand-driven technology, and partnerships between a broad range of private and public institutions have broadened the technology development, commercialization and transfer process.

There is an increasing emphasis around the world now on strategies and instruments for promoting innovation and creating entrepreneurial ventures. In this context, technology-business incubators are showing evidence of effectiveness in creating growth-potential enterprises, employment incomes, technology commercialization and other benefits.

Following this strategy, leading universities of the developed countries have successfully oriented them towards innovation, entrepreneurship and commercialization. In contrast, such initiatives and approaches in Pakistan are severely constrained by complex legal and regulatory barriers. Also, we are falling short of what ideally we should have achieved by forging strong academia-industry linkages. As a result, the institutional sustainability in higher academia is jeopardized.

Science and technology has always rescued the humanity from the challenges it has confronted. To keep pace with these challenges, whether these relate to health or water or energy security, or climate change, or others, we need to accelerate the process of innovation and commercialization. And, to do so, we need to create a culture of entrepreneurship in our institutions of higher learning and research.

Embracing innovation and entrepreneurship across campus encourages technology transfer offices to support research-based startups, either from within their offices or by working with other groups across campus. In this regard, we need to learn from best practices being followed by the leading research universities with regard to demand-driven technology development and commercialization.

Science and technology has always rescued the humanity from the challenges it has confronted. To keep pace with these challenges, whether these relate to health or water or energy security, or climate change, or others, we need to accelerate the process of innovation and commercialization. And, to do so, we need to create a culture of entrepreneurship in our institutions of higher learning and research.

Mr. Akram Shaikh

Member Science, Pakistan Science Foundation

Technological progress and innovation are at the heart of economic development. They have played a crucial role in the convergence of income levels of a number of developing countries by directly effecting on their productivity and economic growth. The academic research plays an important role in promoting this technological progress as well as economic growth.

In developed countries, the development of innovative, commercial products that occurs today all depends on advances in basic research made by researchers a few years back. Similarly in Pakistan now there is dire need to move a step forward from basic research. It is required to initiate and support significant, collaborative R&D activities towards transformation of basic research into applied research for the commercial benefit of the country. It is time to foster the development of new research partnerships between academia and industries by supporting short-term research and development projects aimed at addressing industry-specific problem.



Mr. M.A. Jabbar

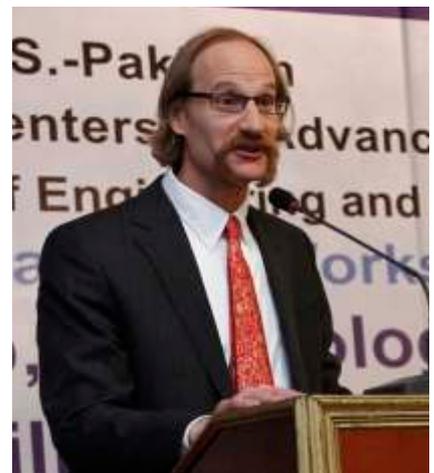
Former Vice President Federation of Pakistan Chambers of Commerce & Industry (FPCCI)

The knowledge based economy contributes towards the development of a country and the vision 2025 of Pakistan gives a clear road map to achieve the desired socio-economic development. He emphasized on the tax reforms and suggested that universities may come forward to Planning Commission for research based grants for enhancement of the innovation and commercialization.

Prof. Dr. Steve Burian

**Project Director USPCAS-W
on the part of University of Utah, USA**

For entrepreneurship and commercialization ventures we need the capacity development. He believes that concept of commercialization, generation of demand-driven technology, and partnership between a broad range of private and public institutions have broadened the technology development, commercialization and transfer process. He suggested integrating technology commercialization in degree courses at the level of higher education.



Senator Nisar A. Memon

Former Federal Minister of Information

Since this century belongs to the knowledge-based societies for which universities have to play a vital role to deploy a “triple helix model” to strengthen the academic-industry-government relations. He suggested that government and corporate sector should invest in clean energies like Hydel, Solar and Wind. He showed the concerns over judicious and equitable water distribution and said that water availability in Pakistan is decreasing and the country is moving fast from stressed to scarcity of water from current 1066 cubic meters per capita availability to about 858 cubic meters per capita in 2025.

He while emphasizing paradigm shift to technological economic development suggested that universities have to respond climate change challenges and join the global endeavors reflected in COP21 and also the efforts may be taken for Ecopreneurship



Vote of Thanks by

Prof. Dr. Bakhshal K. Lashari

Project Director, USPCAS-W, MUET

An event like this cannot happen overnight. The wheels started rolling months ago. It required planning and birds eye for details. In this regard, we have been very fortunate to receive technical assistance and organizational support from the team of very motivated and dedicated colleagues from the University of Utah. I would also like to extend my thanks to the Pakistan Science Foundation for partnering with us in organizing this event. I would be failing in my duty if I do not convey my thanks to the representatives of Industry, I/NGOs, Academia, Civil society and Media who have joined us today to examine the issues and challenges surrounding Entrepreneurship, Technology, and Institutional Sustainability in Higher Academia. Needless to say that organization of this event would not have been possible without the financial assistance of USAID to US-Pakistan Center for Advanced Studies in Water, at MUET.

Session – II: Key Note Address

Dr. Ishrat Husain, Dean/Director of IBA Karachi and Former Governor State Bank of Pakistan chaired the session wherein; Mr. James Thompson, Director, Technology & Venture Commercialization Office, University of Utah gave key talk

Universities as Engines of Economic Growth in the 21st Century: Key Note by Mr. James Thompson, Director, Technology & Venture Commercialization Office, University of Utah

Mr. Thompson gave an extensive talk on what a university shall be doing in order to be the engine of economic growth in a given country. He emphasized upon transforming academic research findings into practical applications resulting in new products to induce positive impact on society and economic growth. He also gave an overview of the history of UU in technology commercialization – from institutionalizing the protection of intellectual property and startups to run the business companies, which started some 50 years back in 1968. Illustrating the case of UU in becoming commercialization engine, Mr. Thompson described the vision of successful innovation ecosystem as under;



Dr. Ishrat Hussain

Dean/Director IBA Karachi and
Former Governor State Bank of Pakistan



Universities have to do tremendous job to develop the talent of the students and transfer the ideas into opportunities instead of getting them reproduce the answers of five questions in examinations. Our society is facing various issues including monopoly of market structure, fear of failure, plagiarism, pricing, taxation, water rights, and water market consequently requiring a strong regulatory framework of commercialization of innovations.

Dr. Ishrat Hussain talked about five “Is” to be considered and encouraged for the commercialization of technology in the larger benefit of society. These five Is were; Inspiration, Incentive to Discover, Institutions, Infrastructure and Innovation.

Session – III: Challenges of Entrepreneurship

The session was chaired by Dr. Tariq Hassan, former Chairman Securities & Exchange Commission of Pakistan (SEC). Dr. Arabella Bhutto of MUET spoke on Innovation Ecosystem, Dr. M. Shahid Qureshi of IBA spoke on Entrepreneurship, Mr. Haroon Dugal Esq. of RIAABG spoke on Patenting Law and Dr. Rashid Aftab of RIU spoke on Trends in Science-Industry Linkages.

The Innovation Ecosystem: Lessons from Pakistan; Dr. Arabella Bhutto, Co-Director, ISTD MUET

Dr. Arabella positioned that a large and diverse array of participants and resources are essential pre-requisite that contribute to and are necessary for innovation in a modern economy. While discussing the innovation ecosystem, she mainly stressed upon three key participants that together would achieve the commercialization of innovation ecosystem i.e. university research, Industry expertise and Government policy. Whereas; finance, human capital, institutions, laws & regulations, business enabling environment and management system were specified as major resources for such ecosystem. Dr. Arabella put forward the following suggestions;

- Government may establish/support establishing Venture Capital Companies
- Banks may design products to avoid collateral assets - IP
- Reforms required in HEC Entrepreneurship Policy – Business enablers: understanding social dimension of innovation
- Entrepreneurial curriculum in Science and Engineering disciplines – educate to innovate
- Conduct industry driven research – Research advisory committee with industry
- Association of ORICs and incubation centers



Entrepreneurship

Dr. M. Shahid Qureshi

Associate Director Centre for Entrepreneurial Development, IBA Karachi

Entrepreneurship comes from the very passion and love of an individual towards materializing an idea for setting up a business. Mr. Shahid defined the process of entrepreneurship as passion/love, expertise, prototype from own resources, and then scaling up with financing and industry. He also gave examples from students of IBA who have been successful in setting up enterprises by transforming their core ideas. He maintained that higher education institutes are not to produce entrepreneurs but only to add value and guidance in transforming the creative ideas into commercialization.



Patenting Law

Mr. Haroon Dugal Esq

RIAABG

The focus of Mr. Haroon's talk was the patents; that how to move from an idea to a patent or how to patent an invention idea. However; the laws and regulation in relation to the Patents, Trademarks, and Copyright were also explained. Further it was also elucidated that how IP can be linked and transformed into business and what inventions can be patented and how.

Trends in Science-Industry Linkage

Dr. Rashid Aftab

Director Riphah institute of public policy, Riphah international university- Islamabad.

The pace of knowledge generation and its impact on new product and process development and the emergence of new interdisciplinary areas, are providing opportunities for nations. Mr. Rashid presented the international scenario of development in science & technology, innovation, entrepreneurship, and technology commercialization by relating it with the investment for innovation and low value added goods. He stated that there is a direct relationship between research & development and the socio-economic development. A robust innovation ecosystem is enabling government policies that promote private sector R&D. He defined commercialization as the process or cycle of introducing a new product or production method into the market.



Session – IV: Supporting Entrepreneurship

The second session on “Supporting Entrepreneurship” was chaired by Dr. Mukhtar Ahmed Chairman Higher Education Commission through video link, facilitated by Dr. Tariq Banuri from University of Utah. Mr. James Thompson spoke on the Commercialization Strategy whereas; Dr. Arabella Bhutto (MUET), Dr. M. Shahid Qureshi (IBA), Mr. Vaseem Bohra (FPCCI) and Mr. Haroon Dugal Esq were part of the panel discussion.

Dr. Mukhtar Ahmed

Chairman HEC

The first and the foremost action for technology commercialization has to be providing the enabling environment for research at higher level academia. HEC is determined to create an infrastructure that encourages the universities to step forward beyond academic research and develop strong linkage with the industry. Dr. Mukhtar stated that government is aware of the importance of the subject and ready to support the universities for the larger benefit. In this connection, HEC established business incubation centers – the ORICs (Offices of the Research, Innovation and Commercialization in many universities of the country. He also reminded various other initiatives taken by government/HEC contributing towards technology commercialization. He advised that all researchers should be given exposure of entrepreneurship.



Mr. Waseem Vohra

Vice President, FPCCI

Mr. Vohra emphasized upon the expectations of industry and business community from academia at higher education level. He elaborated that we need to focus on the core production of universities i.e. the graduates. He stressed upon universities to produce those products which, at the moment, industry is importing. These included imported machinery, clothes and chemicals etc. Need of the time is that universities offer solutions to the industry requirements so that local products/inputs are used for the enhanced economic development of the country.

Commercialization Strategy

Mr. James Thompson

TVC - University of Utah

Mr. Thompson suggested following actions that universities of Pakistan and business community may take to initiate the process of technology commercialization.

- 1 Develop Intellectual Property Policy (IPP) – This must be university specific
- 2 Encourage faculty to invent/disclose – Universities must facilitate the inventive process
- 3 Develop and execute process for evaluating disclosures – ORIC may take charge of it
- 4 Offer courses in “Entrepreneurship” - Build prototypes and develop business plan
- 5 Develop University-Industry productive linkages

Other participants on the panel also spoke and participated in the question and answers session.



Recommendations

Following recommendations were formulated during the one day workshop “Entrepreneurship, Technology, and Institutional Sustainability in Higher Academia”.

1. Compilation of TVC related initiatives of HEC
2. Compilation of TVC related success stories of IBA Karachi
3. University Innovation Policy by making IP its part
4. Establish a one stop shop within FPCCI or some other institution for those who want to pursue their innovations for commercialization
5. Promote IP policy, encourage disclosure and execute process of evaluating disclosures
6. Create productive link with Industry
7. Share/Replicate the models available with other universities
8. Courses on entrepreneurship in higher education
9. FPCCI to provide a forum for funding opportunity

