

ANNUAL DIRECTORY Edition 2018

The Entrepreneurial Scientists of Pakistan

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About the Edition

This is the first edition 2018 of annual directory of entrepreneurial scientists of Pakistan. This edition presents 10 academic scientists of Pakistan who contributed in the society and industry. The collection only means the sampled scientists in our study. There are number of good scientists with great impact, we could not reach out to them yet. Our limitation also includes our interviews and survey about the life of these selected scientists. We have conducted detailed interviews of the scientists, peers, associates, beneficiaries and the people worked or lived with these scientists. Most of the scientists are under observation of our study for last 2-3 years.

The criterion of inclusion is academic person having proven impact in the society other than academic role of teaching, research, publication and administration. The society means any type of business, social venture, development activity, and interventions have improved the life of people. The magnitude of impact and scope is very broad and multidimensional.

Our journey of study on entrepreneurial scientists started back in 2013 in response to a question that can scientists play dual role of serving academia and society. The collection of case studies of good number scientists for the purpose of a book gave birth to the idea of annual directory.

Now, the project is a regular and continuous study of these scientists. The directory will be published annually along with their video documentaries. The scientists can share their academic and non-academic impact with rafia@irp.edu.pk for review and inclusion.

Authors are highly thankful to Mr. Abid H K Shirwani, DG, UMT/President SATHA, and Mr. Wajeeh Uddin, Chancellor, Jinnah University for Women, for their kind support for the authors.

Rahmat Ullah

Dr. Rashida R Zohra



President's Message



This is an incredible effort to inspire young scientists on how to serve society along with their academic pursuits. I always advocate entrepreneurship in teachers, researchers, faculty members and students. A person who thinks beyond the routines and brings about an innovative way of doing the assigned job actually possesses entrepreneurship and innovativeness. These entrepreneurial scientists are real heroes as they transform novel ideas into practical products and services. This book will inspire young scientists to become hybrid scientists to serve science and society.

Abid H K Shirwani
President
South Asia Tripel Helix Association

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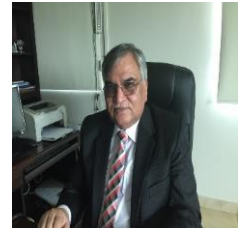
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Case Studies of Entrepreneurial Scientists of Pakistan

Case No. 1: Dr. Abdul Hameed, University of Management & Technology, Lahore: “Propagating Inclusive Education in Pakistan for Special Children”

Personal Information:

- **Name:** Dr. Abdul Hameed
- **Born:** Pakistan
- **Nationality:** Pakistani
- **Institutional Affiliation:** Dean School of Social Science and Humanities, University of Management and Technology, Lahore, Pakistan
- **Alma Mater:** Ph.D. in education from Ohio State University, Columbus, Ohio, U.S.A



Problem Background:

The term inclusive captures in one word, an all-embracing societal ideology. Regarding individuals with disabilities and special education inclusion secures opportunities for students with disabilities to learn alongside their non-disabled peers in general education classrooms.

In Pakistan, several initiatives have been taken by the governments and NGOs for addressing the special education needs of children with disabilities. Some researchers have demonstrated successful models of special and inclusive education, however a comprehensive analysis of these initiatives has not been undertaken in Pakistan. Teachers, researchers, professionals and parents are aware of the concept of inclusive education in Pakistan but are not sure how it's implemented in an ordinary setting. In some places teachers or school directors refuse to accept a child with moderate disability for these types of reasons. Hence in Pakistan it was difficult to find the good practice models for the inclusive education of special children.

Research and Development:

Dr. Abdul Hameed has spent 14 years of his career in special education. He has been the chairman of the department of special education in University of the Punjab where he started work on special education. He started social work for special children from his own children's. He then make his passion and mission that disable children's should also get education at higher level and should also participate in different jobs. He pulled all resources available for introducing the M.A in special education in University of the Punjab and for this purpose Vice Chancellor of PU at that time Lt. Gen. (R) Arshad Mahmood gave incentives and full support for launching MPhil and PhD degrees for disabled students.

After a few years this degree become most popular in Pakistan as students from India, Sri Lanka and Iran also come here for special education. The major challenge that he faced during his career is to find the out of school children and to educate them. Pakistan is the top second country after Nigeria, where the number of out of school children increases day by day. Dr. Abdul Hameed then joined UMT and introduced first ever B.S. 4 year program for deaf students. This program was first introduced in America very early and now feasts in all west. The integrating of deaf students with normal student is the major challenge that he think. But he found very good response, after three months of launching the program all students are friends and comparatively they performed well. Now he is working to implement this inclusive education all other departments of UMT such as computer science, business management and commerce to include UMT worldwide known top inclusive universities of the world. His prominent contributions are;

- Introduction of B.S 4 years program for deaf students
- Introduction of MPhil and PhD degrees for disabled students
- Launching and promoting inclusive education in Pakistan

Social Impact:

The inclusive education is important because now Higher Education of Pakistan developed policy to include special children into education. The inclusive education serves many advantages to the society because through diversity we certainly add to our creativity. If you don't have a diverse classroom or a diverse world, you don't have the same creative levels and I think our strength as a whole lies in our diversity.

Scholarly Impact:

- The initiative of inclusive education for special children has generated many jobs and the research opportunity for MPhil and Ph.D. researchers.
- Published 53 papers in national and international journals and presented 50 plus papers in national and international conferences.
- He has been reviewed PhD thesis as external examiner and supervised 14 doctoral dissertations.

Case No. 2: Dr. Abdul Rauf, University of Azad Jammu Kashmir: “Capacity Building and Sensitization of Barbers and Beauticians of Muzaffarabad for Prevention of Hepatitis”

Personal Information:

- **Name:** Dr. Abdul Rauf
- **Born:** Pakistan
- **Nationality:** Pakistani
- **Institutional Affiliation:** Assistant Professor, University of Azad Jammu and Kashmir, in collaboration with Human Appeal International- Pakistan and Department of Health, Government of AJ&K
- **Alma Mater:** Ph.D. from University of the Punjab, Lahore.



Problem Background:

Hepatitis B, C and HIV/ AIDS have become an ever-increasing health problem for Pakistan. Almost 10% of the total population has been infected with one of these viruses.

These diseases not only inflict heavy human loss but also a huge capital loss which drains from the country during the import of medicines for treatment. According to some recent estimates, an amount of 60 billion US\$ is required to treat the existing disease burden, which will further increase as there is no effective vaccine against hepatitis C and HIV.

Unfortunately, no effective prevention policy at the state level has been adopted to halt the spread of these diseases. This situation demands the adoption of precise preventive steps by blocking the transmission routes of these viruses. Barbers and beauticians are among the major but yet ignored disease transmitters in the society. They are quite ignorant of the fact that they may be the source of hepatitis and HIV transmission from one customer to the other.

Research and Development:

Dr. Rauf planned and executed the current project which focused on educating and sensitizing the barbers/beauticians about their role in the spread of disease, and measures which they could take to stop disease proliferation in order to save the lives of hundreds and thousands of their customers as well as the masses of Muzaffarabad city and catchment areas.



Dr. Rauf, representing the University of AJK, in collaboration with Human Appeal International- Pakistan and Department of Health, Government of AJ&K, took the pioneering initiative of sensitizing and training of the barbers/ beauticians of Muzaffarabad. They were also taught practices which could eliminate the transmission of these deadly diseases. A practical demonstration of sterilization was also performed by the participants. At the end of the training workshops, 50 state-of-the-art sterilizers were distributed among participants through a lucky draw. A total of 50 personal hairdressing kits were also distributed among the students of UAJK to promote the trend of personal hairdressing kit among customers.

Social Impact:

A total of about 600 barbers/ hairdressers and beauticians of Muzaffarabad City were included in the project. They were divided into a group of 50 individuals in each workshop. During the workshop, they were educated regarding hepatitis and AIDS as well as their role in transmitting these diseases. These 600 barbers cater for the needs of 1.2 million catchment population of AJK along with half a million tourists per year. Their unhygienic practices were exposing customers to deadly infectious diseases, but this risk has now been minimized through this project. This cost-effective intervention at the country level can be very helpful in the prevention of deadly hepatitis and AIDS in Pakistan.

The key outcomes of the project are:

- In-time diagnosis and treatment of the barbers/ beauticians who were suffering from hepatitis and AIDS, which is helpful in saving their lives.

- During the awareness sessions, more than 2000 students and teachers of the University were also educated as an added benefit of the project.
- Government health department extended an extraordinary support towards the project by allocating funds for the complete diagnostics including treatment of all the suspects of the disease and vaccination of all the disease-free cases, which has made the project a completely comprehensive healthcare intervention.
- Training certificate has been announced mandatory for all the shops by the government agencies which will ensure safe hairdressing practice in future.
- This activity will reasonably increase the business of hairdressing/ beautician industry in the city by attracting tourists and other catchment populations due to risk-free practices.
- A sense of community service was inculcated among the university students at large, turning them into responsible and active citizen in line with the University's mission.
- Unhygienic practices of barbers were exposing 1.2 million catchment population of AJK alongwith half a million tourist customers, to deadly infectious diseases, but this risk has now been minimized through this project
- **Muzaffarabad** is on its way to becoming the **first hygienic hairdressing city of the country**.

Scholarly Impact:

- The project generated the research opportunity for two M.S and four B.S researchers.

Publications:

- Abdul Rauf, Muhammad Shahid Nadeem, Nuzhat Shafi, Maher un Nisa Awan, Sumayya Aziz, Jahnanzeb Khurshid, Nisar Ahmed, Khushi Muhammad and Bibi Nazia Murtaza. Beauticians and barbers with high prevalence of HBV, HCV and HIV infections: a serious health threat to the population of Kashmir, Pakistan. *International Journal of Infectious Diseases* (Submitted)
- Abdul Rauf, Syed Ayaz Kazmi, Madiha Khalid, Tasleem Akhtar, Jahnanzeb Khurshid, Khushi Muhammad, Muhammad Shahid Nadeem and Nuzhat Shafi. Impact of preventive training on the practices of beauticians and barbers of Muzaffarabad: A cost-effective disease control intervention in Pakistani perspective (Under Preparation)

Case No. 3: Dr. Azmat Ali Awan, Pakistan Oilseed Development Board: “Development of Olive Industry in Pakistan”

Personal Information:

- **Name:** Dr. Azmat Ali Awan
- **Born:** Peshawar, Pakistan
- **Nationality:** Pakistani
- **Institutional Affiliation:** Pakistan Oilseed Development Board under the ministry of National Food Security and Research
- **Alma Mater:** Ph.D. from University Agriculture, Peshawar.



Problem Background:

Pakistan being an agricultural country still relies on import of edible oil. Its import comes next to petroleum products. Edible oil has been one of the major economic expenses of our country. The main issue underlying this situation was the unprofitable production of olives. Even after having the most favorable conditions for olive cultivation in various parts of Pakistan, the demand for local production was not met and that ended in importing olive oil at heavy expense. In previous attempts to develop the olive cultivation, lack of knowledge among local farmers and selection of unsuitable regions for cultivation had rendered it unsuccessful.

Research & Development:

Realizing the resources, Dr. Azmat developed an idea to make Pakistan self-sufficient in producing olive oil or at least meet 50% of total country need. For this purpose he took training on “Olive Propagation Techniques” at Izmir Olive Research Institute Turkey in 2006. Afterwards in 2009 a project was sponsored by Italy in which Dr. Azmat worked as a local coordinator. In the project, Promotion of Production and Commercialization of Olive Oil in Pakistan, he trained the local farmers regarding olive grafting and planting using local language and communication so information could easily be disseminated. Sessions on olive pruning and orchard management were specially designed to increase the productivity. Dr. Azmat worked under different projects for the propagation of olive planting and grafting. During this work he, along with his teams identified approximately 870,000 hectares area suitable for olive plantation in Pakistan, among which 60% were in FATA region, 17% in KPK and 21% in Baluchistan region. KP and Baluchistan belt specially included Bajur Agency, Kurram Agency, Waziristan, Bannu, Buner, Lower Dir, Malakand, Mardan, Swat, Khyber Agency, Swabi, Barkhan, Loralai, Musa khel and KillaSaifullah. To increase the farmer’s learning output; demonstration on plantation of olives was also made the part of training.

Economic Impact:

With the help of these campaigns olive plantation has remarkably been increased in the regions of Balochistan, Potohar and KPK. Local market of olives in Pakistan is also growing gradually and its by-products including olive oil, Olive pickle, jam, olive Murabba and green tea are also being made at larger extent.

The main target is to achieve at least up to 50% of the total requirement of olive in the country which is only possible when we start promoting it. During year 2001 to year 2009 following areas were established for olive cultivation which have been properly functioning till now:

- Olive Model Farm Sangbhatti , Swabi: 170 Acres
- Olive Farm Pirsabak, Nowshera: 125 Acres
- Olive Orchard Tarnab Farms: 25 Acres
- Izhar Farms, Chakwal: 400 Acres
- PACIFIC Farms, Nowshera: 80 Acres

Economically, development of Olive industry, its local production, processing produced a strong and positive impact on our economy. Its total plantation per hector is approx. 250 and its total oil yield is about 1750 Liters with total olive yield per plant of about 50 KG attained. These figures point that promotion of olive cultivation in suitable areas of Pakistan will contribute significantly in creating a healthy environment; both economically and socially.

Scholarly Impact:

He has completed his Ph.D. in Horticulture (Olives) from University of Agriculture, Peshawar in 2014. Dr. Azmat has been Nominated as Productive Scientist of Pakistan by Pakistan Council of Science and Technology (Discipline: Agricultural Sciences, Nomination Code: 741) And also has the privilege to have written a article on Olive Oil in Pakistan in an International Book published in Italy titled "A Guide to the World of Extra Virgin Olive Oil" By Marco Oreggia and Laura Marinelli, pp: 739-741, 2015. He completed 7 months consultancy with PPAF on olive value edition.

He is a member of Editorial Board of International Journal Agricultural and Environmental

Research (IJAAER) and also holds the honor to receive 11th Ambassador Award in the field of Olive from Brazilian ambassador at Pakistan on 4th November, 2017 at Islamabad. .He has 06 impact factor publications as well as 25 HEC recognized publications. Also he has been a co advisor of 14 MSc (H) thesis and BSc (H) students.

He attended many national and international conferences/workshop/trainings in the country and abroad. He also imparted training to different organizations regarding olive nursery production, orchard management, pruning and training and harvest and post-harvest of olive.

Case No. 4: Dr. Faisal Khan, Institute of Integrative Biosciences, CECOS University, Peshawar: “Initiating Multiple Entrepreneurial Ventures”

Personal Information

- **Name:** Dr. Faisal Khan
- **Born:** Riyadh, Saudi Arabia
- **Nationality:** Pakistani
- **Institutional Affiliation:** Director, Institute of Integrative Biosciences, CECOS University, Peshawar; Cofounder and CEO, Peshawar 2.0
- **Alma Mater:** DPhil in Systems Biology, University of Oxford, UK



Problem Background:

Dr. Faisal Khan is an entrepreneurial scientist with tremendous passion to convert science into solutions that can address local problems and help us in driving sustainable development and economic growth. Dr. Faisal took the difficult path of testing his own ideas and experimenting with innovative models. He is undoubtedly demonstrating new ways of how a scientist can contribute to society and catalyze economic development.

After his training at Oxford, Dr Faisal Khan returned back to Peshawar, Pakistan, and decided to serve his nation. He found existing institutions very constraining for new ideas and thoughts, both by scientists and students who otherwise have a lot of potential.

He spent his first year in a one of the largest public sector universities, but failed to face the inertia and create any change. This is when he decided to test out his ideas by exploring newer avenues, especially in the private sector. The biggest problem in his view was the absence of an institution which combines academic excellence and entrepreneurial flair to accelerate economic growth and bring prosperity to the society. But this was his chance to prove that it is possible.

Research and Development:

Since his return in November 2013, Dr. Faisal Khan has undertaken three substantial initiatives which are noteworthy. Firstly, he pitched the idea of a cross-disciplinary biology institute to a 30 years old private engineering university in Peshawar. Within two weeks, they signed the papers and the Institute of Integrative Bioscience (IIB) was born. IIB was meant to be world-class (zero compromise on quality), lean (purposefully frugal and devoid of extravagance) and agile (extremely quick on keeping up with the latest trends).

These principles found a lot of leverage in the private sector and these could not be afforded in large, older institutions that are sources of inertia. IIB now has 100+ students and a start-studded team of biologists in its faculty. The institute takes a lot of pride in the curriculum it has developed for the BS and MS programs in Biotechnology, and the laboratory resources it offers to its researchers and students alike. The faculty is engaged in undertaking cutting edge research in areas such as Nano biotechnology, molecular biology, synthetic biology and systems biology.

The Institute is also very popular for the Bio-Entrepreneurship course it offers (also developed and taught by Dr Khan), the first ever Startup Weekend event for Biologists and a remarkable STEM Outreach program that has reached over 20,000 school children across the country - from Chitral to Karachi.

Secondly, Dr Khan established Peshawar 2.0 (P2) - a social enterprise that is working really hard to engineer and foster the local startup ecosystem in Peshawar. P2 has organized some of the largest technology events in the country, runs one of the oldest co-working spaces in the country (Basecamp), and a unique incubator+accelerator program (Revolt) for local startups. Since 2013, Peshawar 2.0 has successfully mobilized different stakeholders including the Government of KP, the World Bank, UNDP, all 13 universities in the City, and their student bodies to promote innovation and entrepreneurship on the City.

Finally, Dr. Faisal Khan successfully demonstrated how public-private partnerships can work in science in a Pakistani context. Faisal designed and spearheaded a new science project under the annual development budget of the Government of KP. The project called 'Propagation of Synthetic Biology' (abbreviated SynBioKP) was intended to initiate and propagate activity in the emerging new area of Synthetic Biology and bring it to Pakistan. This was carried out through different training, activities, conferences and more important participation in the IGEN Competition that takes place in Boston, USA. IGEN started at MIT in 2004, and the IGEN Peshawar was the first ever team that took part in it in 2016.

The pioneering team of undergrads was selected from all across the country and hosted by Dr. Faisal Khan's lab at IIB to conduct synthetic biology research. The team developed a biosensor for the detection of poisonous gases like carbon monoxide and oxides of nitrogen.

They took the project to Boston for Pakistan's maiden participation and surprised everyone in the country with a Bronze medal. This was a major achievement in its validation of 1) local talent and 2) local capacity, and demonstrated that cutting-edge science can actually be carried out in our circumstances in Pakistan if the right will and direction are there. The iGEM Peshawar 2017 team worked on a reporter fish and grabbed a Silver Medal in the 2017 finals in Boston, USA.



Economic Impact:

Through Peshawar 2.0, the Bio Entrepreneurship course and SynBioKP, Dr. Faisal Khan has helped catalyze more than a 100 startups in Peshawar's ecosystem and trained more than 26,000 students in business, science, and technology. After its pilot stage worth 12.5 million rupees, SynBioKP has recently received an approval of 300 million rupees from the Government of KP, which promises to further scale all the activities under the project.

Scholarly Impact:

Dr. Faisal Khan got his Masters in Integrative Bioscience and DPiL in Systems Biology from the University of Oxford, United Kingdom. He also attended the Saïd Business School as the SIP Fellow to study strategy and innovation.

He held the HEC Overseas Scholarship during his studentship and won the Oxford Noon and the St. Anne's College Domus Award. His most recent awards include the Yong Development Leader Award by the Federal Planning Commission, two annual SATHA innovation awards in a row, the P@SHA Tertiary Student Project Award for the IGEM project, and the Government Innovation Award for SynBioKP by the Pakistan Innovation Foundation. Dr. Khan has more than a dozen articles, abstracts, and conference posters, and has been invited to 60+ talks and guest lectures nationally and internationally. Dr. Khan also advises the federal and provincial government. He is part of numerous boards and task forces in the areas of Science and Technology, Education, Higher Education, Information Technology, Industries and Youth Policy.

**Case No. 5: Dr. Ghulam Hussain, Govt.
Postgraduate College Toba Tek Sing:
“Developing Local Technologies of Leather
Dyes for SRC”**

Personal Information:

- **Name:** Dr. Ghulam Hussain
- **Born:** Jhang, Punjab Pakistan
- **Nationality:** Pakistani
- **Institutional Affiliation:**
Assistant Professor of chemistry,
Govt. Postgraduate College Toba
Tek Sing
- **Alma mater:** University of Punjab, Pakistan



Problem Background:

Pakistan presents huge trade deficit due high import volume and less production of exportable goods and services. Almost 30% imports are contributed by chemicals as the big share of the pie after fossil fuel and edible oil. The import of dies in leather and textile also contribute major share of import. Pakistan needs to do R&D in import substitution and production local dies. SRC (Shafi Reso Chem) is among the companies which import dies and need local technologies.

Research and Development:

Dr. Ghulam Hussain a college professor in chemistry having fire in belly and dream in eyes to do something applied and significant in life. He was in search of any opportunity to exploit his chemistry knowledge and research for the benefit of the industry and society.

He did his MPhil research study with Sandal Dyestuff Industry and developed Syntansas outcome of his research. Finally, Dr. Ghulam Hussain got connected with SRC a company thirsty for innovation.

Dr. Ghulam Hussaun got the opportunity to substitute imported leather dies in partnership with SRC. It took him initial 2-3 years to do basic research and develop some formulations. Shortly his R&D brought fruits and he was able to install first pilot then commercial plant of leather dyes. This plant substituted significant amount of imported dues and saved country foreign reserves.

He took up the assignment of second plant and succeeded after next 2-3 years of R&D. His R&D based two commercial level plants are working successfully in SRC.

Economic Impact:

Developed two locally fabricated plants of dyes production leading to import substitution and great economic impact worth billions.

Scholarly Impact:

- He has produced 14 research publications published in high repute journals.

Case No. 6: Dr. G. Sarwar Markhand, Shah Abdul Latif University, Khairpur, Sindh: “Developing Tissue Culture Technology for Date Palm Growers Industry”

Personal Information:

- **Name:** Dr. G. Sarwar Markhand
- **Born:** Pakistan
- **Nationality:** Pakistani
- **Institutional Affiliation:** Director, Date Palm Research Institute, Shah Abdul Latif University, Khairpur, Sindh
- **Alma Mater:** Ph.D. Molecular Genetics (UK)



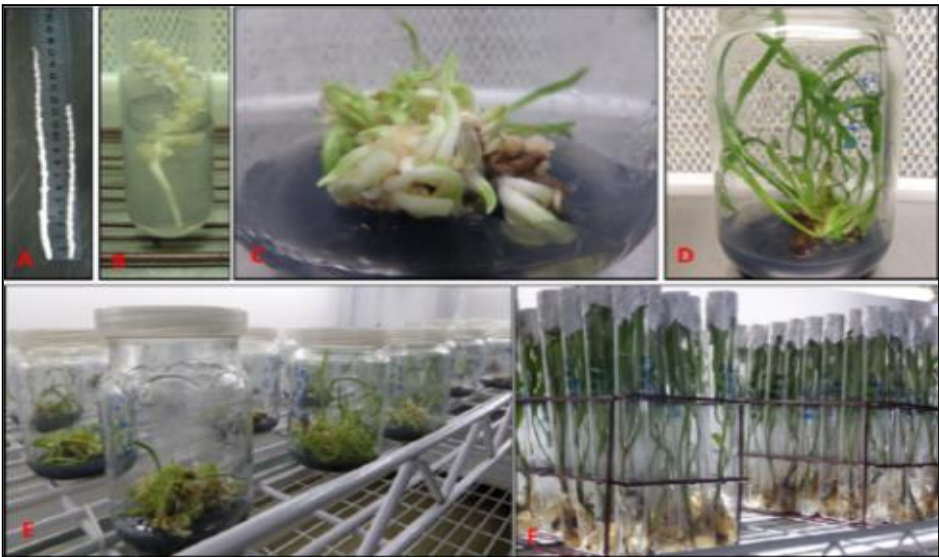
Problem Background:

District Khairpur is located in remote part of Sindh, Pakistan, with a rural economy heavily dependent on the date palm industry. The date palm plants cultivated and planted conventionally take 4-5 years to bring fruits.

The mortality rate is generally high and sometimes offshoots bring diseases with them which eventually become the source of the problem for the whole area. If the variety has little occurrence then not many offshoots can be available at a time. There is also no chance to cultivate high-value varieties that can fetch high prices for farmers.

Research and Development:

Dr. Markhand being an active and challenge accepting scientist, got an opportunity to establish Date Palm Research Institute (DPRI) through a project funded by the Higher Education Commission (HEC). He took the opportunity with great zeal and benefitted society with good quality, rapidly growing date palm trees. The specialized science work was then ready to impact the rural economy.



Around 1000 plants of different date palm varieties produced through tissue culture were distributed free of cost as a gift to the local farmers in September 2014. Some of these plants have given fruit this year. These plants are disease free, uniform in age, availability in terms of quantity, very low rather next to nil mortality rates, easy to transport, fruiting in a third year, etc. These plants are quarantine free and boundaries less.

Economic Impact:

DPRI now sells plants ready to cultivate on the subsidized rate of Rs.1000 and few thousand plants have already been sold to the local community. Science has done magic for the rural community. Instead of waiting 4-5 years and facing high mortality, they will start enjoying the fruits in three years' time only with nearly no mortality.

Scholarly Impact:

- Ph.D. from Institute of Grassland and Environmental Research (IGER), Aberystwyth, UK, Post Doctorate from University of Reading, UK
- Won Commonwealth Scholarship
- Published more than twenty research papers
- Widely presented his research work in the country and abroad
- Supervised MPhil and PhDs.

Case No. 7: Dr. Irfan Ahmed Shiekh, College of Earth and Environmental Sciences, University of the Punjab: “Developing Water Treatment Technology”

Personal Information:

- **Name:** Dr. Irfan Ahmed Shiekh
- **Born:** Pakistan
- **Nationality:** Pakistani
- **Institutional Affiliation:** Assistant Professor
College of Earth and Environmental Sciences,
University of the Punjab.
- **Alma Mater:** Ph.D. from University of Punjab, Lahore.



Problem Background:

The generation of wastewater and excess usage of fresh water in industrial production is very serious issue all over the world as well as in The Entrepreneurial Scientists-Serving Science and Society Pakistan. The environmental problems and water scarcity is a very serious concern caused by industrial wastewater. It contributes a lot of hazardous chemicals into the main water stream and groundwater.

Research and Development:

Dr. Irfan Shiekh took this challenge in his Ph.D. study to develop technology which can reduce water consumption in textile dyeing process. His thesis title was Development of AOPs based Novel Technology for Water Conservation and Pollution Reduction in Textile Dyeing. A total of seven (7) international patents have been awarded on the novel research work, which reduced pollution load and water consumption in textile dyeing process for cotton knits.



Dr. Irfan has assigned his Ph.D. students (Miss Nabeela Firdus and Mr. Azhar Ali) to work with SRC Pvt. LTD (Shafi Reso Chemicals). The aim of the project was the reduction of water consumption through reuse /recycling, and wastewater treatment by adopting Zero Liquid Discharge (ZLD) approach. The group has succeeded in implementing recycling system of chromium in Basic chromium sulphate (BCS) unit. 100 % recycling of chromium-contaminated waste water inside the BCS helped to control its discharge in mainstream (Zero Discharge approach) as well as save its treatment cost and freshwater consumption (45 T/Month).

Economic Impact:

- Signed a contract with German Company, Thies GmbH & Co. KG, for commercialization of patented technology, worth US\$0.50 million, in 2009.
- SRC project resulted in 50% of wastewater reduction and 30% water consumption saving, leading to economic benefits for millions.
- Dr. Irfan has provided consultancy to the industry for water treatment, water recycling and water saving giving economic benefits to millions.

Scholarly Impact:

- Dr. Irfan has 30 research publications, 07 patents, 13 books and 18 years academic and industrial experience.
- He has produced 15 M.Phil. Graduates and is supervising many PhDs.
- Dr. Irfan Ahmed Shaikh is a truly an entrepreneurial scientist with hybrid skills of moving between science and practice. He teaches in the university and provided consultancy to the industry, particularly textile dyeing and finishing companies. He publishes research papers and solves industry problems by assigning his PhDs for industrial research.

Research Team of Dr. Irfan Ahmed Shiekh

- **Mr. Azhar Ali, PhD. Scholar**
- **Name: Miss. Nabeela Firdous, PhD. Scholar**



Case No. 8: Dr. Muhammad Zubair, Khushhal Khan Khatak University Karak: “Development of Olive Growing Industry in Karak”

Personal Information:

- **Name:** Dr. Muhammad Zubair
- **Born:** Pakistan
- **Nationality:** Pakistani
- **Institutional Affiliation:**
Assistant Professor,
Khushhal Khan Khatak
University Karak
- **Alma Mater:** Ph.D from Dalian University of
Technology, China.



Problem Background:

The Karak District presents a very high potential for olive industry but it never grew as an olive industry due to local obstacles. The Pakistan Oil Seed Development Board, Agriculture Department, and some donor agencies started olive plantation and top work during 2002. It failed in District Karak due to reservations of the communities about forest conversion into commercial varieties due to fear of deforestation and lack of awareness about the benefits of olive.

Research and Development:

Dr. Zubair representing Khushal Khan Khattak University, Karak, in collaboration with SMEDA and PODB, revitalized efforts and initiated a comprehensive community mobilization program. The notables from communities, after having exposure visits to edible olive bearing districts, were motivated to start the olive top working in their groves. Olive Pruning and Orchard Management trainings were conducted. This resulted in a very positive change in the community and started demanding olive grafting and plantation. The Agriculture Research GoKP joined and by June 2017, a total of 1000 plants were grafted at TarkiKhel and Speena of District Karak. Till date, 80% success has been reported. Additionally, the olive orchards were initiated and around 1000 plants were planted at Latamber area, Khushal Khan Khattak University, Karak. Plantation at other areas of District Karak are in process.



Economic Impact:

The program will, therefore, improve the income level and create more employment opportunities in District Karak. Major program beneficiaries will be the farming community, whose living standards will be improved, resulting in poverty alleviation. Additionally, CPEC is focused and this program will bring a major contribution by exporting olive oil and value addition of different olive products such as green tea, pickles, dry fruits, etc.

Scholarly Impact:

- Assistant Professor, Ph.D. in Computer Science and Ex Director ORIC
- Published 09 research papers and presented in many national and international conferences
- Technical reviewer of Impact Factor journals
- Established BIC and ORIC in KKKU

Case No. 9: Dr. Waheed Noor, University of Balochistan: “Developing Application Software for University and Industry”

Personal Information:

- **Name:** Dr. Waheed Noor
- **Born:** Paksitan
- **Nationality:** Pakistani
- **Institutional Affiliation:** Assistant Professor, University of Balochistan
- **Alma Mater:** PhD. from Asian Institute of Technology, Thailand



Problem Background:

Dr. Waheed Noor joined University of Balochistan as a lecturer in computer science and completed his Ph.D. in machine learning from Asian Institute of Technology, Thailand. He saw his university troubled in multiple crises which could be partially solved through process automation. UoB could not afford billions for process automation of the largest institution of the province which was already crippled with financial crises. He decided to help UoB and initiated in-house development of many software applications.

Research and Development:

The opportunity of serving as department head enabled Dr. Waheed to exercise his entrepreneurial capabilities. Dr. Waheed and his team developed an excellent local system of distance education. This system integrates teachers, students and university management for a number of educational activities. They won the project of developing internal examination system for the University of Baluchistan. This system saved millions in cost and also saved billions by preventing corruption done through the conventional system. His team is working on a system to integrate all the matters of students including hostels. This project will automate all the matters of students and things will be recorded, tracked, updated and accessed within a short time.

Dr. Waheed won FAO project worth 0.85 million and delivered it successfully. He delivered on 60%-70% cost of the market-saving lot of money for FAO. Dr. Waheed is working with a number of other organizations for short and long-term projects.

Economic Impact:

He saved minimum 15 million of UoB through in-house development. In-house development has been providing IT services to Public and Private sectors and contributing to Revenue generation.

Scholarly Impact:

- Currently serving as Assistant Professor at Department of Computer Science, University of Balochistan, Quetta, Pakistan
- He has an additional charge of Director, Office of the Research, Innovation & Commercialization (ORIC) and

Directorate of Distance Education, University of Balochistan.

- Obtained Ph.D. from Asian Institute of Technology, Thailand, in 2013 in “Learning Predictive Models for Optimization”, Computer science.
- He is an approved HEC supervisor, technical reviewer of IEEE journals and has published in impact factor journals.

Case No. 10: Dr. Zafar Iqbal, University of Peshawar: “Initiating Multiple Pharmaceutical Ventures”

Personal Information:

- **Name:** Dr. Zafar Iqbal (Tamgha-e-Intiaz)
- **Born:** Mardan, Pakistan
- **Nationality:** Pakistan
- **Institutional Affiliation:** Meritorious Professor, Department of Pharmacy, University of Peshawar
- **Alma Mater:** Ph.D. Dept. of Pharma.Sci. University of Strathclyde, Glasgow, Post.doc. Pharma. Sci. Institute of Pharmacy and Biomed. Science, University of Strathclyde, Glasgow. U.K.



Problem Background:

Mr. Ashfaq Ahmed Paracha was a banker by profession with vast international exposure. While living in Peshawar, he got interested in setting up a pharmaceutical plant in KP. He had zero knowledge about pharmaceuticals. However, he was driven by the high spirit to serve the country with economical and affordable drugs supply.

Another lesson that he learned from his global exposure was that university scientists can help him to set up his dream unit of pharmaceuticals. This belief brought him to the University of Peshawar where he met Dr. Zafar Iqbal, an entrepreneurial scientist serving the Pharmacy Department.

Dr. Zafar Iqbal has been In-charge of Research in Sibro Pharma Ltd. Nowshera, Production In-charge at Redex Drug House Labs., Faisalabad, and Head, Production & Quality in Wellcome Pakistan, Karachi. He set up many laboratories for pharmaceutical industries and helped many industries for drug registration. His research group developed two fast released ant-emetic formulations and these are patented research products in Pakistan. He has applied for 4 other patents.

Research and Development:

The university-industry collaboration took birth between the Pharmacy Department, University of Peshawar and Delta Pharma. Dr. Zafar took it as a challenge to convert his science into economical drugs for the community. He identified, formulated and set up production with high quality and assured compliance with local and international standards. Delta Pharma, which has been running successfully, was the outcome of the entrepreneurial approach of Dr. Zafar Iqbal.

The project was successfully completed with support and trust of a businessman on the university research skills.



This is not the single case of the entrepreneurial zeal of Dr. Zafar. He served many other industries, set up quality labs, designed production process and helped industries for drug registration. He is the scientist equally known to academia and industry with patents, publication and production consultancy to his credit.

Scholarly Impact:

- Ph.D. and Post Doc. from Dept. of Pharma Science University of Strathclyde, Glasgow, U.K.
- He has 135 research paper publications to his credit
- Supervised more than 30 MS and PhD theses
- Chief Editor of a journal and member editorial board of more than 10 journals.
- Won and managed funded projects worth millions (PKR).
- He organized five conferences and contributed chapters in two books
- He got two patents in Pakistan

Conclusion

The entrepreneurial scientists' phenomenon is very common for advanced world and relatively new for developing world like Pakistan. The science assumes the role discovering novel unknown knowledge of natural world generally and human aspects specifically. The exploitation of knowledge is left over to industry people. The journey of exploitation of knowledge by academics is started in the developing also. This annual directory is the product of regular and continuous research about these scientists who believe to serve science and society.

The ability of academics to assume and perform dual role of science and society lies in their belief followed by capacity to manage this role. The few scientists in the same environment are able to contribute in the society and industry along with their teaching, publications and administration in the universities.

They are driven by their belief to serve the society and supported by their capacity to manage conflicting demands and challenging environment.

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