



Research At
LUMS 2014



CONTENTS

Research at LUMS - An Overview	2
Cross-Disciplinary Research at LUMS	11

EDUCATION

Getting Children Back in School	14
A Case of Representing Asia	16
LUMS Physlab: Sharing Knowledge and Expertise	17

DEVELOPMENT

Exploring Religious Endowments in British India	22
Navigating the Cultural Frames for Negotiation	24
Crime Mapping for Evidence Based Policing	26
The Case for Trade Normalisation Between Pakistan and India	28
Making and Shaping Contemporary Pakistan	30

TECHNOLOGY

Control Strategies for Autonomous Off Road Robotics in Agriculture and Demining	34
Why Non-Tariff Barriers Just Don't Work	36
Reducing Response Times for the LUMS Emergency Medical Services	38
A Primary Care Toolkit to Tackle Child Labour and Promote Health Equity	40
Internationalisation of Manufacturing: The State of Pakistani Firms	42
PhD Graduates Research – Class of 2013	44





Research at LUMS – An Overview

Message from the Director, Office of Sponsored Programmes (OSP)

Dr. Shafay Shamail

Since its inception, the Lahore University of Management Sciences (LUMS) has strived for excellence in its pursuit to create and impart knowledge. Research has become an integral part of the university as it has provided a platform for faculty to make new discoveries. It has helped in creating new technologies that provide economic benefits to the society, providing health solutions to combat deadly diseases such as hepatitis, introducing management methods to increase efficiency in industries as well as combating issues such as poverty for the betterment of the society and economic welfare of the country.

LUMS aims to establish itself as a centre of excellence where students and faculty members from different schools engage in research for knowledge creation and make ground breaking discoveries that are acknowledged not only in Pakistan but also internationally. The university has been able to establish strong ties at the national as well as the international level with various donor agencies, universities as well as key industries. The Office of Sponsored Programmes (OSP) established in August 2010 facilitates faculty in seeking and managing their research grants.

During the year 2013, LUMS faculty members succeeded in winning 17 external grants amounting to PKR 142.70 million in total, whereas during the same period LUMS provided 15 grants through the Faculty Initiative Fund (FIF) amounting to PKR 8.27 million. Moreover, 49 travel grant applications were funded by LUMS through the Faculty Travel Grant (FTG) amounting to PKR 13.83 million, whereas 12 applications were approved for funding by the HEC during 2013 amounting to PKR 3.9 million.

The highlights of the research activities of LUMS faculty during the year 2013 that were supported through OSP are presented on the following pages. OSP strives to provide opportunities to expand research collaboration activities.

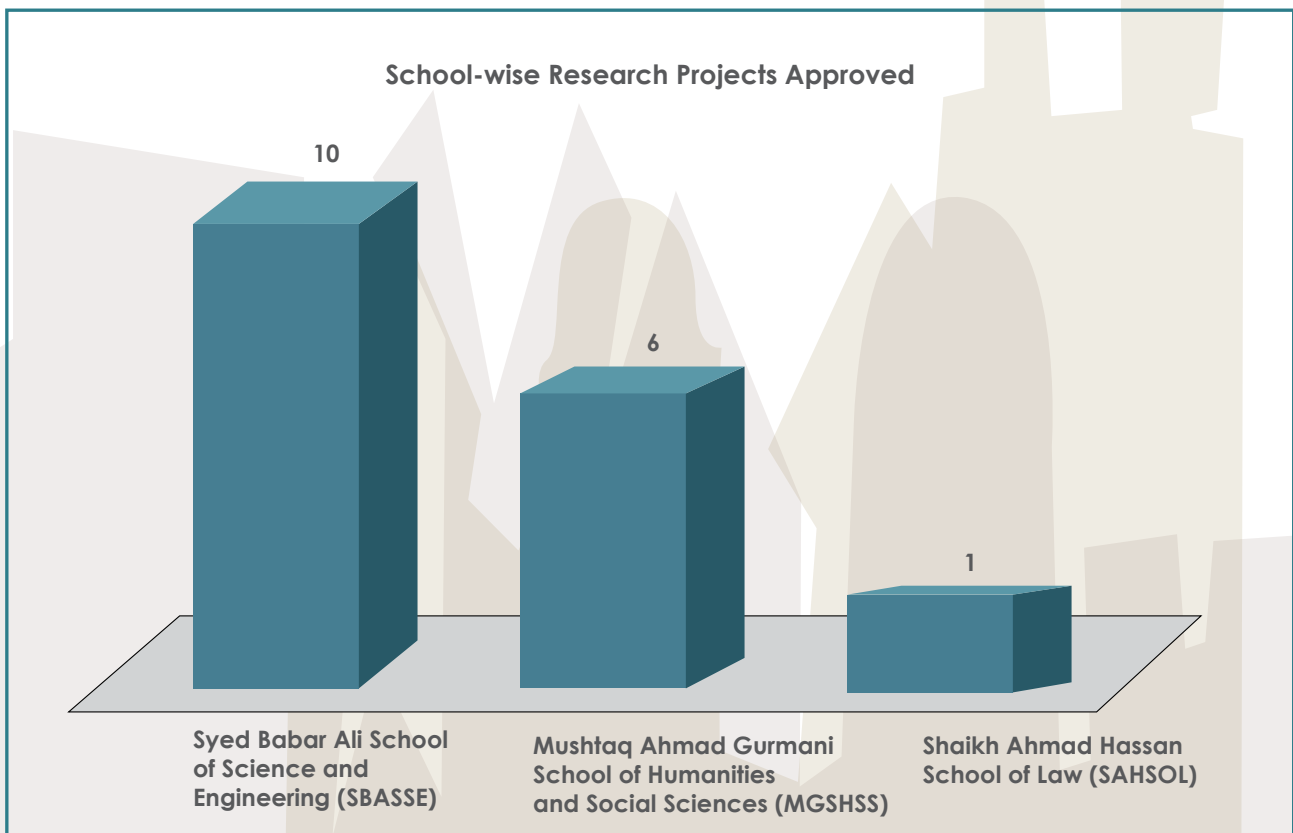
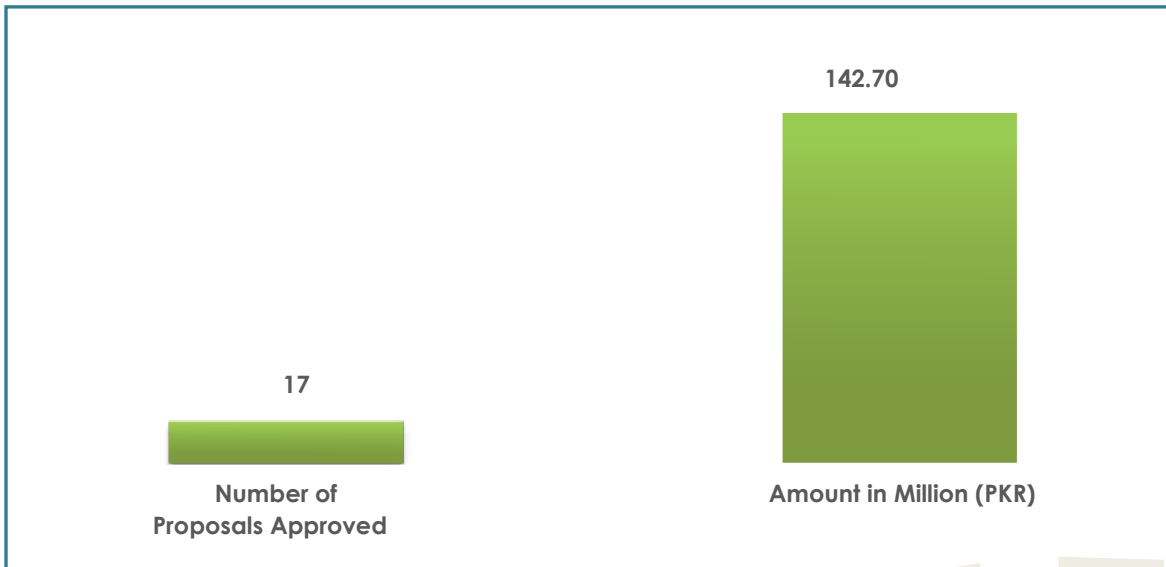


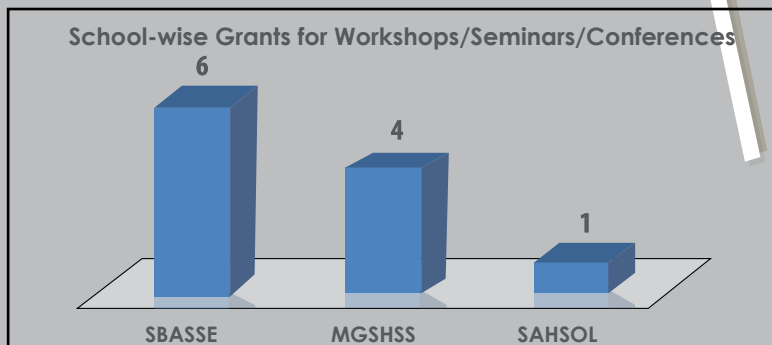
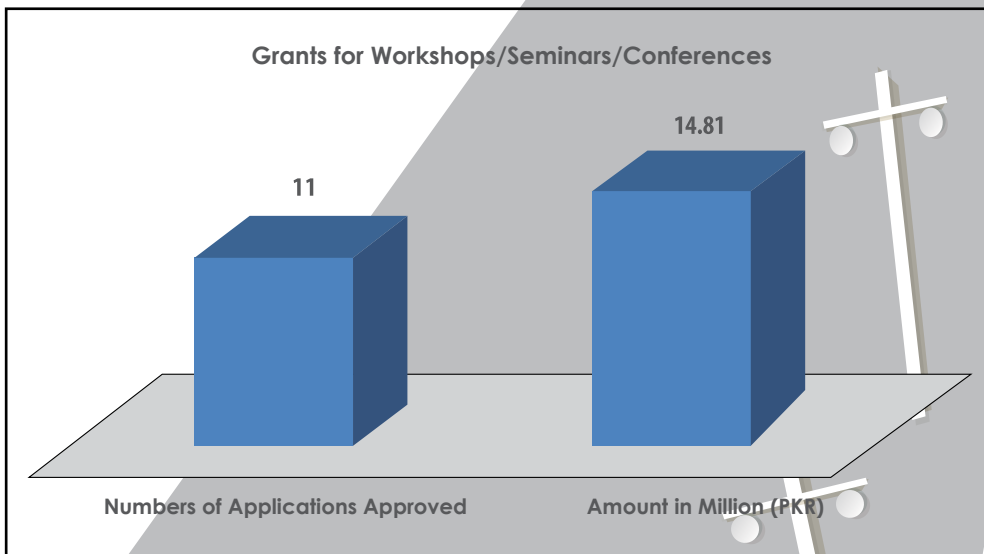
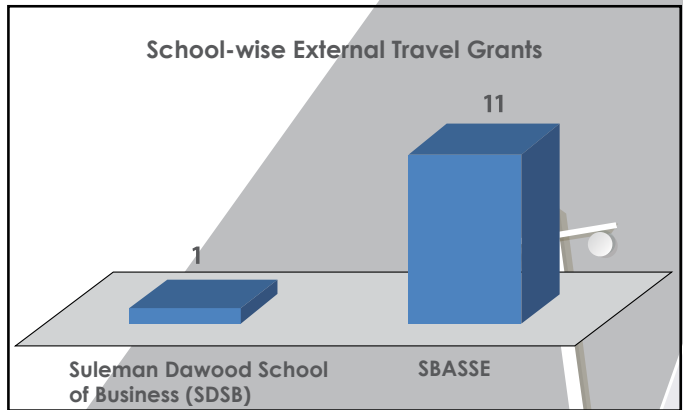
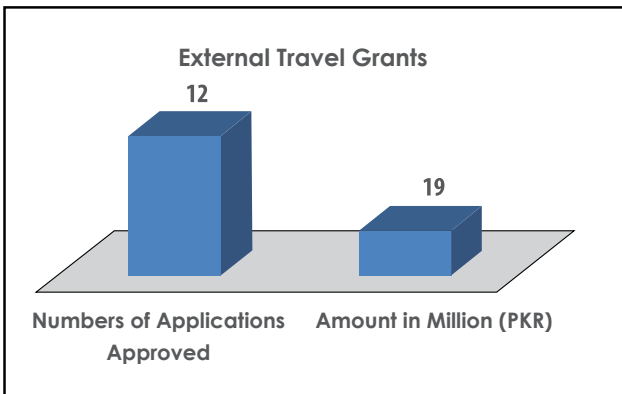
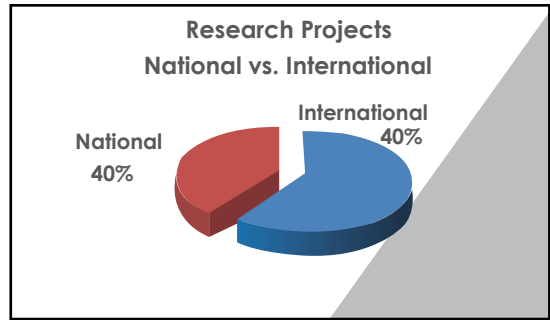
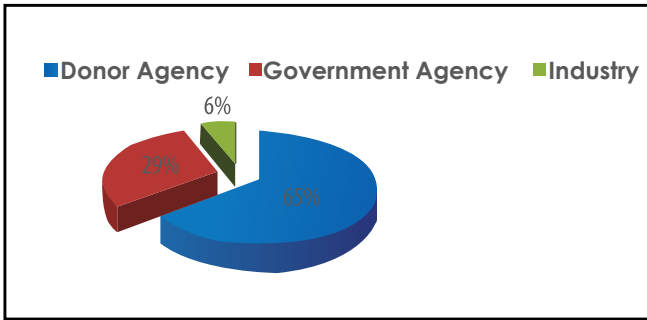




Research at LUMS – An Overview

Research Grants Approved

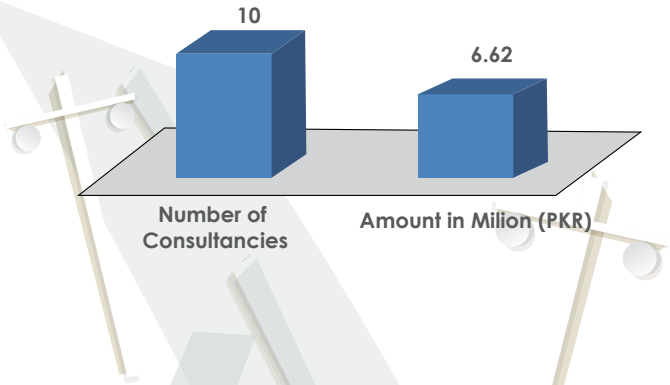




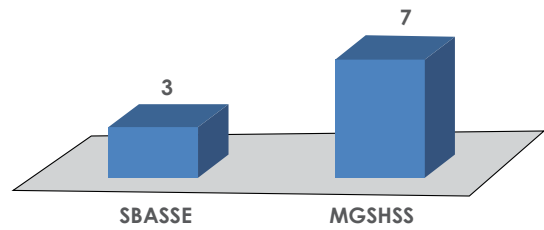


Research Grants Approved

Consultancy Assignments

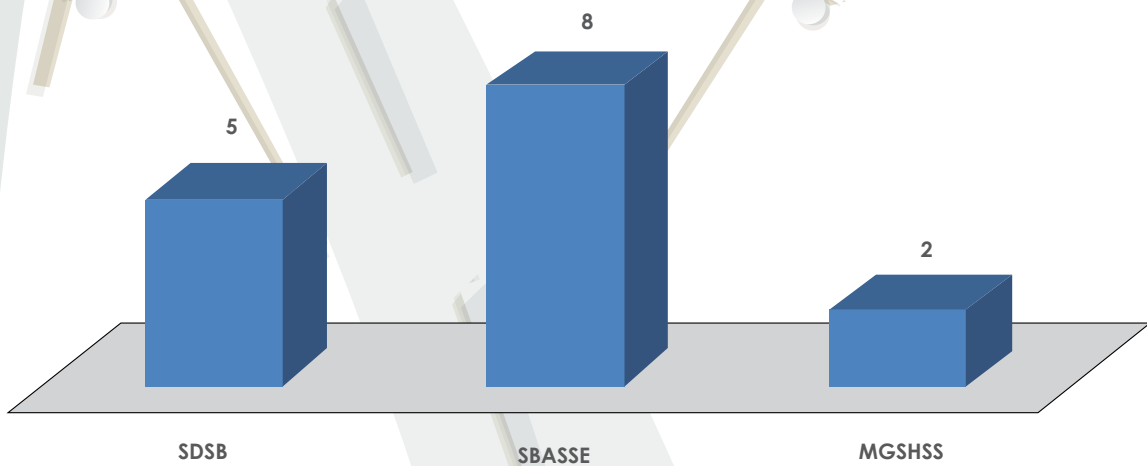


School-wise Consultancy Assignments



LUMS Faculty Initiative Fund (FIF) Grants

School-wise Faculty Initiative Fund (FIF)



Assistant Professor Ghayoor Abbas Chotana (SBASSE)

Design and Synthesis of Novel Functionalised Polycyclic Aromatics for Potential Applications in Organic Electronics

Assistant Professor Ihsan Ayyub Qazi (SBASSE)

Improving Performance of Cloud Data Centers Using Software-defined Networks

Associate Professor Zakir Ullah (SBASSE)

Production of Induced Pluripotent Stem Cells from Patient Biopsies

Assistant Professor Waqas Majeed (SBASSE)

Automatic Detection of Epileptic Events in Clinical Data: A Collaborative Project with Punjab Institute of Mental Health

Assistant Professor Rahman Shah Zaib Saleem (SBASSE)

Synthesis of New Aromatically Decorated Chemotype Targeting MDM2-P53 Interaction, With Potential Applications in Cancer Treatment

Assistant Professor Misbah Tanveer Choudhry (SDSB)

Labour Market Participation Decisions in Pakistan - A Gender Perspective

Assistant Professor Salman Khan (SDSB)

Impact of Access to Finance on the Growth of SMEs in Pakistan

Assistant Professor Choudhry Tanveer Shehzad (SDSB)

Sovereign Ratings Changes and KSE Sentiment

Assistant Professor Rashid Memon (MGSHSS)

Do Migrants Bring Their Castes With Them: Identity and Occupational Mobility In Lahore

Assistant Professor Ali Mohsin Qazilbash (SAHSOL)

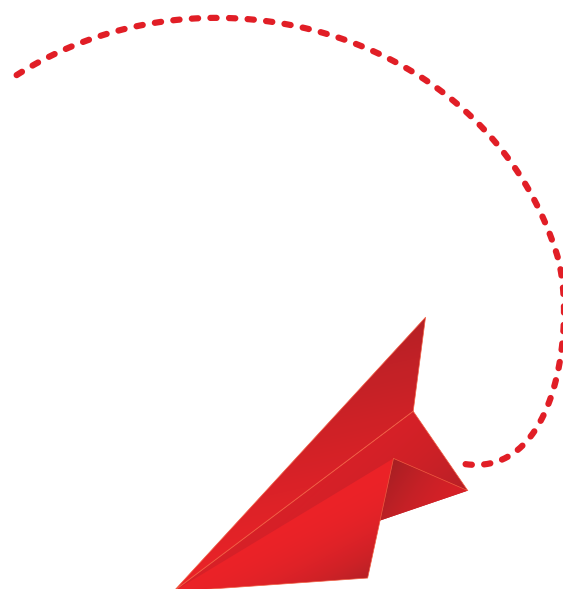
The Supreme Court of Pakistan's Landmark Decisions and Legal Lexicon Project

Assistant Professor Ijaz Haider Naqvi (SBASSE)

Design and Development of Wireless Sensor Networks in Industrial Monitoring and Control

Assistant Professor Basit Shafiq (SBASSE)

A Privacy-Preserving Framework for Collaborative Business Process Composition



ative Business Process Composition

Associate Professor Muhammad Sabieh Anwar (SBASSE)

Observing Magnetization Dynamics of Single Molecule Magnets Using Polarized Light

Associate Professor Kamran Ali Chatta (SDSB)

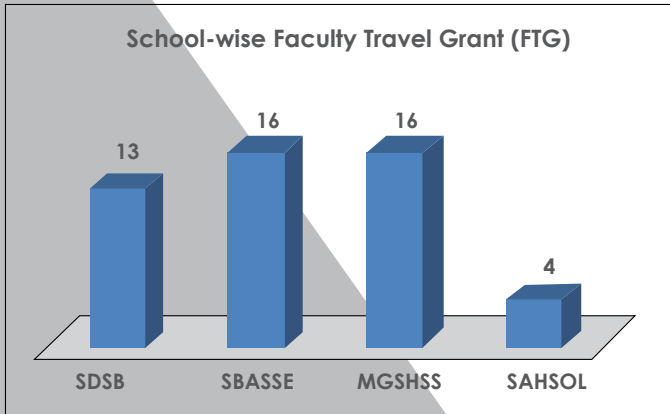
Internationalization of Manufacturing – The State of Pakistani Firms

Assistant Professor Samina Quratulain (SDSB)

Cultural Frames for Negotiation

Research at LUMS – An Overview

LUMS Faculty Travel Grants (FTG)



Assistant Professor Hasan Karrar (MGSHSS)

China & Krygzstan

Markets and Merchants in Central Eurasia, Part 1: Formal and Informal Trade Modalities Between the People's Republic of China and the Republic of Kyrgyzstan

Assistant Professor Amber Riaz (MGSHSS)

Edinburgh, UK

The Gettier Problem at 50

Associate Professor Ali Khan (MGSHSS)

London, UK

The Pleasure of the Spectacle

Assistant Professor Nida Kirmani (MGSHSS)

Nottingham, UK

2nd International Symposium on Language and Communication: Exploring Novelties

Associate Professor Shahid Masud (SBASSE)

Beijing, China

2013 IEEE International Symposium on Circuits and Systems

Associate Professor Jahangir Ikram (SBASSE)

Pretoria, SA

International Conference on Applied Energy 2013

Assistant Professor Naveed Arshad (SBASSE)

Fez, Morocco

Sustainability in Energy and Buildings 2013

Associate Professor Zartash A. Uzmi (SBASSE)

Turin, Italy

IEEE ICC

Assistant Professors Salman Khan/Ayesha Bhatti (SDSB)

Boston, US

Global Colloquium on Participant Centered Learning

Assistant Professor Saad Azmat (SDSB)

Boston, US

Global Colloquium on Participant-Centered Learning

Associate Professor Muhammad Junaid Ashraf (SDSB)

Japan

7th Asia Pacific Interdisciplinary

Assistant Professor Abdul Karim Khan (SDSB)

Orlando, US

Academy of Management Annual Meeting

Professor Anwar Khurshid (SDSB)

Victoria, Canada

Annual Conference of the North American Case Research Association (NACRA)

Assistant Professor Ayesha Bhatti (SDSB)

Mumbai, India

2nd Module Of Global Colloquium on Case Writing Workshop

Assistant Professor Ghufan Ahmad (SDSB)

Boston, USA

2nd Module of GLOCOLL Program at Harvard Business School

Associate Professor Sadaf Ahmad (MGSHSS)

Seattle, USA

Society for Cinema and Media Studies Annual Conference

Assistant Professor Richard Ganis (MGSHSS)

Oregon, USA

52nd Annual Meeting of the European Society for Phenomenology and Existential Philosophy

Assistant Professor Syed Muhammad Hussain (MGSHSS)

Singapore

Economic Review Conference 2013

Associate Professor Asim Karim (SBASSE)

Dallas, TX, USA

IEEE International Conference on Data Mining (ICDM2013)

Assistant Professor Muhammad Fareed Zaffar (SBASSE)

Big Island, USA

Hawaii International Conference on System Sciences (HICSS-47) 2014

Assistant Professor Junaid H. Siddiqui (SBASSE)

Silicon Valley, CA, USA

28th IEEE/ACM International Conference on Automated Software Engineering (ASE 2013)

Visiting Faculty Nauman A. Zaffar (SBASSE)

Istanbul, Turkey

3rd International Conference on Electric Power and Energy Conversion Systems (EPECS 2013)

Associate Professor Irshad Hussain (SBASSE)

Miramare-Trieste, Italy

Invited Talk at Second Conference on Nanotechnology for Biology and Biomedical Applications (Nano-Bio-Med 2013)

Associate Professor Shafay Shamail (SBASSE)

Seoul, Korea

7th International Conference on Theory and Practice of Electronic Governance (ICEGOV 2013)

Associate Professor Mian Muhammad Awais (SBASSE)

Daegu, Korea

20th International Conference on Neural Information Processing (ICONIP2013)

Assistant Professor Momin Uppal (SBASSE)

Istanbul, Turkey

IEEE Wireless Communications and Networking Conference

Assistant Professor Ihsan Ayyub Qazi (SBASSE)

Sydney, Australia

IEEE International Conference on Communications (ICC)

Department Chair, Mathematics Imran Naeem (SBASSE)

Antalya, Turkey

International Conference on Nonlinear Differential and Difference Equations: Recent Developments and Applications

Assistant Professor Adnan Khan (SBASSE)

Madrid, Spain

10th AIMS Conference on Dynamical Systems, Differential Equations and Applications

Assistant Professor Naveed Arshad (SBASSE)

Wales, UK

Sustainability in Energy and Buildings

Assistant Professor Muhammad Zubair Abbasi (SAHSOL)

Cambridge, UK

Institutions and their Discontent: Rethinking Economic Development in South Asia

Assistant Professor Abid Hussain Imam (SAHSOL)

Kuala Lumpur, Malaysia

11th Asian Law Institute Annual Conference

Assistant Professor Asad Farooq (SAHSOL)

Boston, USA

This Land is your Land: Remaking Property after Neoliberalism

Research at LUMS – An Overview

Assistant Professor Uzair Kayani (SAHSOL)
Kuala Lumpur, Malaysia
11th Asian Law Institute Annual Conference

Assistant Professor Ch Tanveer Shehzad (SDSB)
Boston, USA
GLOCOLL Program at Harvard Business School

Assistant Professor Salman Khan (SDSB)
Boston, USA
GLOCOLL Program at Harvard Business School

Assistant Professor Muhammad Shakeel Sadiq Jajja (SDSB)
Palermo, Italy
21st European Operations Management Association Conference

Assistant Professor Muhammad Naiman Jalil (SDSB)
Barcelona, Spain
20th Conference of the International Federation of Operational Research Societies

Assistant Professor Saad Azmat (SDSB)
Kuala Lumpur, Malaysia
Malaysian Finance Association Annual Conference

Assistant Professor Zain ul Abdin Khawaja (SDSB)
Tampa, FL, USA
Global Interdisciplinary Business-Economics Advancement Conference

Assistant Professor Syed Muhammad Hussain (MGSHSS)
Vancouver, Canada
Canadian Economics Association Annual Conference

Assistant Professor Imtiaz Ul Haq (MGSHSS)
Lisbon, Portugal
International Finance and Banking Society Annual Conference

Assistant Professor Hasan Karrar (MGSHSS)
Philadelphia, USA
Association of Asian Studies Conference

Visiting Faculty Bilal Tanweer (MGSHSS)
New York, USA
Re-envisioning Pakistan: The Political Economy of Transformation

Assistant Professor Waqar Zaidi (MGSHSS)
Kentucky, USA
The Society for Historians of American Foreign Relations

Assistant Professor Amber Riaz (MGSHSS)
Fortaleza, Brazil
III Conference of the Brazilian Society for Analytic Philosophy

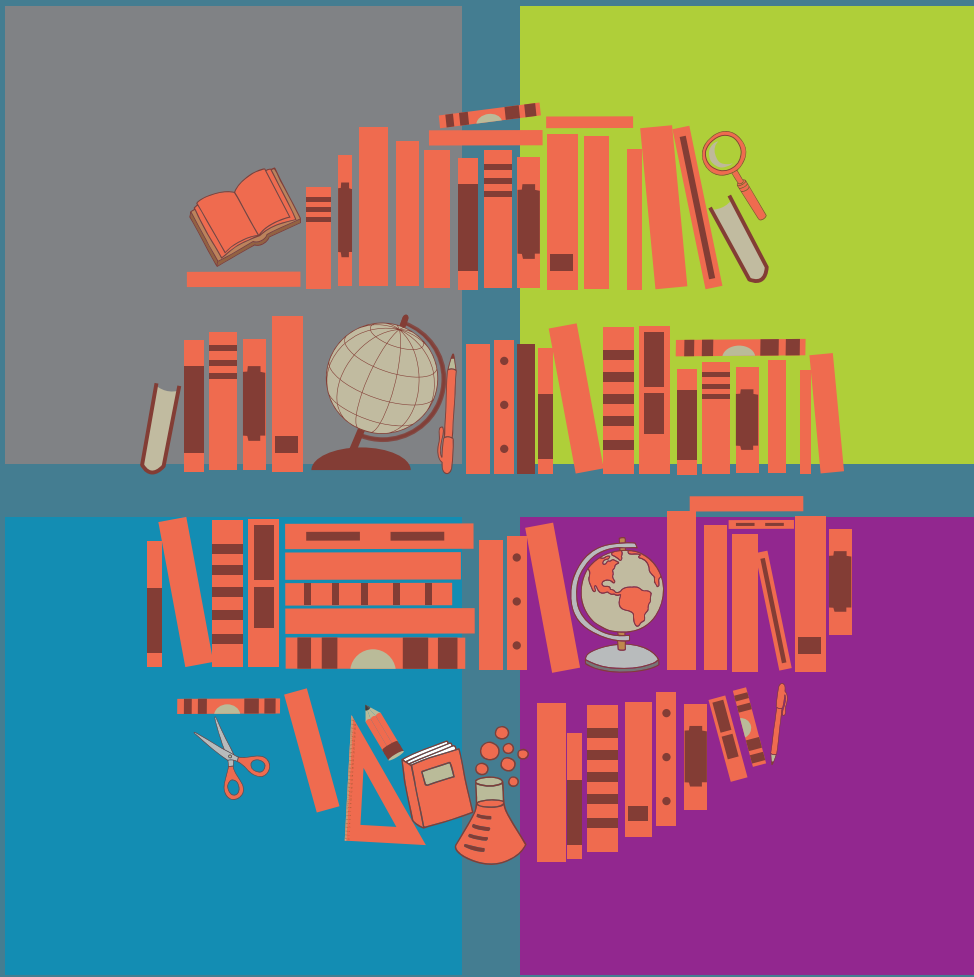
Assistant Professor Lukas Werth (MGSHSS)
London, UK
Anthropology and Photography

Assistant Professor Nida Kirmani (MGSHSS)
University of Zurich, Switzerland
The European Conference on South Asian Studies

Assistant Professor Naveed Rehan (MGSHSS)
Gargnano, Italy
D.H. Lawrence: New Life, New Utterance, New Perspective



Cross-Disciplinary Research at LUMS



EDUCATION

Getting Children Back in School

By Junaid Aftab



As many as 7 million children are estimated to be out of school in Pakistan. Mr. Usman Khan, an adjunct faculty member at the Lahore University of Management Sciences, discusses a report titled 'Out-of-School Children in the Balochistan, Khyber Pakhtunkhwa, Punjab and Sindh Provinces of Pakistan' for The Global Initiative on Out-of-School Children (OOSC), which highlights the policies needed to get children back in school.

The Global Initiative on Out-of-School Children (OOSC), a joint project by UNICEF and UNESCO Institute for Statistics (IUS), has been drafted and planned by the United Nations to help accelerate efforts towards achieving one of the Millennium Development Goals (MDGs) - Universal Primary Education by 2015. UNICEF Pakistan contributed to the initiative by publishing the country report titled *Out-of-School Children in the Balochistan, Khyber Pakhtunkhwa, Punjab and Sindh Provinces of Pakistan* in June 2013. The country group assigned the task of producing the report to Mr. Usman Khan, an adjunct faculty member at the Lahore University of Management Sciences (LUMS), along with Professor Dr. Abid Aman Burki; Ms. Hina Sheikh, Country Economist at the International Growth Center, Pakistan and Mr. Abu Bakar Memon, Manager, Economic Data Resources and Research.

Mr. Khan, along with the other members, worked on this research project primarily on the request of UNICEF Pakistan. He said, "This is a critical problem for Pakistan because as many as 7 million children are estimated to be out of school." The report published by UNICEF Pakistan underpins the magnitude of the problem stating, "The Constitution of Pakistan guarantees the right to education for all children aged 5 –16 years. This right is reinforced by laws, policies and programmes at both federal and provincial levels. Nevertheless, over 6.5 million children are currently not in primary school and another 2.7 million are not in lower secondary school."

"The research included using complex modelling techniques, including the 5 Dimensions of Exclusion Model (5DE), to estimate the number of OOSC in Pakistan and identifying the OOSC in each of the 4 provinces. The main source of economic data used in this report was the Pakistan Social and Living Standards Measurement Survey (PSLM) and its associated Household Integrated Economic Survey (HIES). The study also involved using econometric techniques to conduct analysis to help understand the characteristics of the OOSC children in Pakistan," explained Mr. Khan.

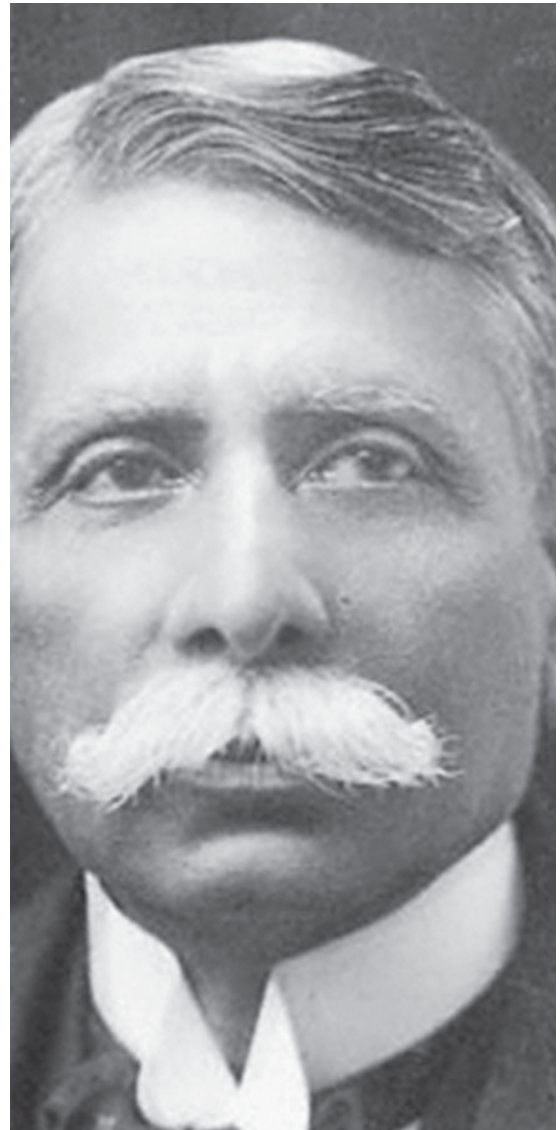
The Five Dimensions of Exclusion (5DE) model is used to analyse the problem of OOSC by categorising the total number of OOSC in five distinct categories. The report states th for instance:

reforms for about quarter of a century and when reforms were eventually introduced they came in the form of general supervision, though provincial legislatures went further ahead. The colonial state was keen not to offend the majority religious orthodox class who controlled such endowments at the behest of minority educated liberal class who wanted state control of endowments. Judicial control of endowments was preferred to administrative control because of its flexibility. This reveals that judicial law-making was a preferred mode of governance in colonial India."

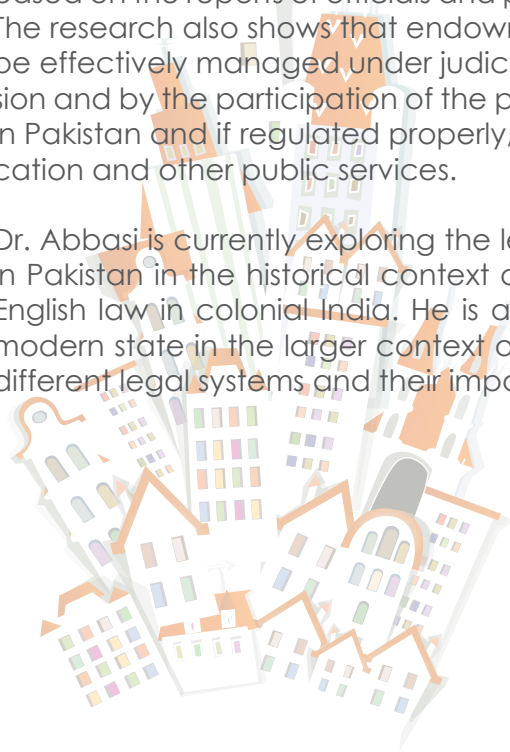
Dr. Abbasi's research helps in understanding the current state structure in South Asia. This was a case study of Muslim endowments. It reveals that the colonial state deliberately preferred judicial law making over legislative law making because the former was flexible. The superior courts developed legal principles and rules in an incremental fashion through their decisions. As the regulation of religious endowments was a sensitive issue, court decisions did not affect the whole society because the decision of the court was binding only upon the parties. At the same time because of the common law doctrine of precedent, judicial decisions provided binding rules of law.

This research also provides insights into the process of law making. Legislative proposals in colonial India were sent for comments to the officials at sub-district levels and made available for comments from the public. The legislation was based on the reports of officials and public views. The research also shows that endowments could be effectively managed under judicial supervision and by the participation of the public. There are a large number of awqāf (endowments) in Pakistan and if regulated properly, they can play an important role in the provision of education and other public services.

Dr. Abbasi is currently exploring the legal process of the 'judicial Islamisation' of property law in Pakistan in the historical context of the convergence of the principles of Islamic law and English law in colonial India. He is also examining the relationship between Sharia and the modern state in the larger context of the scholarship that explores the relationship between different legal systems and their impact on economic and political development of a country.



Syed Ameer Ali (1849–1928)
*Judge of Calcutta High Court
and Privy Council*



Navigating the Cultural Frames for Negotiation

By Aisha Hamid



Dr. Samina Quratulain, Assistant Professor at Suleman Dawood School of Business (SDSB) investigated the negotiation tactics employed by Pakistani negotiators and Canadian negotiators, and made surprising discoveries, providing valuable insight into the culturally variant sphere of negotiation. There is a need for negotiators to become self-aware of the influence of their culture and how it governs and directs their thinking during negotiations which would yield better outcomes.

In a world where the tune of cultural relativism is sung everywhere, it appears unlikely, almost unthinkable, that negotiators would dive into negotiations across borders with a dangerous approach which generalises the effects of culturally specific norms of the concerned parties. The current research on negotiation seems to be travelling this perilous road by extricating cultural norms from the context of negotiation. Dr. Samina Quratulain, Assistant Professor at Suleman Dawood School of Business (SDSB), however, tackles this headlong by investigating the negotiation tactics employed by Pakistani negotiators and Canadian negotiators, and makes surprising discoveries, providing valuable insight into the culturally variant sphere of negotiation.

For this research project, Dr. Samina Quratulain collaborated with Dr. Abdul Karim Khan, Assistant Professor at SDSB, and Dr. Chris M. Bell, Associate Professor at Schulich School of Business, York University, Canada and ran a negotiation simulation when Dr. Bell visited Pakistan. Surprised by the findings of this simulation, which indicated a marked difference between the results of the Pakistani and the Canadian negotiators, the research team dug deeper to comprehend this phenomenon by running surveys that were constructed to correlate efficiency of the negotiators with the negotiation outcomes. Only in the debriefing process after the negotiation classes, when the negotiators shared their anecdotes and their thoughts, strategy and motives behind their negotiation tactics, did the team stumble upon a remarkable finding. "It was discovered that naïve negotiators were using a script to direct their behaviour and expectations in the negotiation, rather than approaching it with a developed skill set that allows them to adapt to and manage the situation," said Dr. Quratulain.

Cognizant of the multifaceted experiences of negotia-

tion and the kaleidoscopic cultural and societal norms that negotiators bring to the table, the team concluded that 'these experiences may form the basis of culture-specific cognitive schemas or scripts.' A set of studies were subsequently conducted which contrasted the performance of naïve negotiators in Pakistan, a relatively collectivistic society, with those of Canada, a relatively individualistic society. Dr. Quratulain explains that naïve Pakistani negotiators are "significantly more likely to characterise negotiation as competitive marketplace bargaining than an agreement between cooperating partners", and as a result, are "comparatively more competitive and less efficient than their Canadian counterparts." The findings of three different negotiations ascertained that Pakistani negotiators were less likely to find integrative tradeoffs and were also less likely to "create value by capitalising on issues that were mutually profitable. Furthermore, these performance results were not influenced by resource distribution, social value orientation or information about the most efficient and mutually profitable and integrative issues."

These studies engendered consistent outcomes that only serve to prove the gravity of the need for negotiators to become self-aware of the influence of their culture and how it governs and directs their thinking and behaviour during negotiations. By being knowledgeable of this fact, Dr. Quratulain hopes that naïve negotiators can then employ more efficient tactics and strategies which would yield better outcomes from negotiations.

The initial findings of this project were presented in the 74th Annual Meeting of the Academy of Management Conference (August 1 - 5, 2014, Philadelphia, USA). The paper recognises exclusion as a limitation of the argument. The paper also highlights a study in which negotiation scripts are assessed; it is now possible to predict performances by using that study to predict negotiation behaviour and processes.

Considering that this research project centres around the negotiation tactics of Pakistani negotiators, Dr. Quratulain proposes that Pakistani negotiators can become more efficient and profitable if they cultivate skills that allow them to adapt to the needs of the negotiation, and if they break the link between cultural norms and marketplace negotiation scripts. Dr. Quratulain concluded, "We aim to reduce conflict and improve performance and cooperation through mutual collaborative ventures, thus bettering the workplace, the economy, the society and, dare we say it, the world."



Crime Mapping for Evidence Based Policing

By Amna Memon



LUMS Technology for People Initiative (TPI)'s Hamza Humayun discusses the "Crime Mapping for Evidence Based Policing" project which helped police identify crime hot pockets in Lahore. As part of pilot study, smartphones were given to 4 police stations to help them locate FIRs and create a 'crime-map' – a visual representation of where and when criminal activity took place, through existing data. With the evidence this tool

provided, the police can identify crime pockets, design effective crime control strategies and ensure efficient deployment of limited resources.

Hamza Humayun, Development Fellow, Technology for People Initiative (TPI), is one of those who believe that technology can be a transformative force in people's lives and every effort should be made to extend its benefits to those left behind by this revolution. The Crime Mapping project of TPI, for which Hamza is in charge, is aimed at improving the ability of the police to gain a better understanding of crime. The project is being conducted in collaboration with IDEAS and Punjab Information Technology Board (PITB).

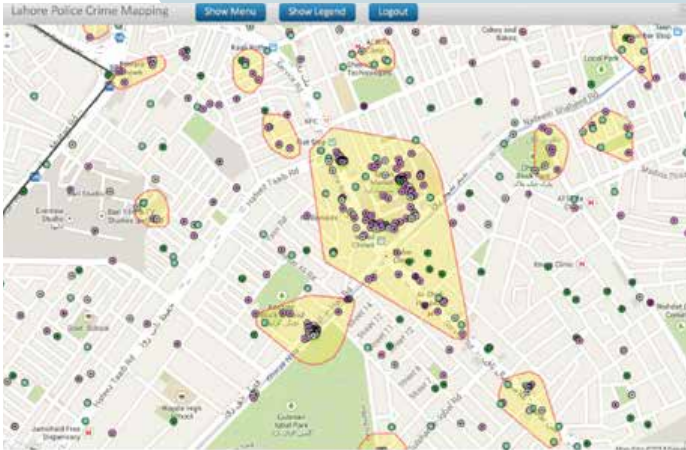
Dr. Ali Cheema of IDEAS had been brainstorming with Police DIG Zulfiqar Hameed on ways to decrease the crime rate in Lahore. After reviewing the relevant literature they concluded that policing focused on disrupting crime hot spots is one of the few crime prevention strategies with compelling evidence in criminology literature. Dr. Cheema and the police wanted Hamza Humayun and his team at TPI to help them use technology to identify the top crime locations in Lahore. "We thought that this was a problem that could have a significant impact on society and also found it to be interesting from a technological viewpoint. Therefore it was decided that we would collaborate on this research with the police and IDEAS," said Hamza.

Hamza and his team have done remarkable work in helping the police. But it was a daunting task. "The size of areas supervised by each police station varies drastically," he explained. "Since the division has been done based on population, a densely populated area will be much smaller and in more rural or sparsely populated areas with wide swathes of uninhabited land, the area will be much larger. Within Lahore, for example, Kahna police station alone is larger than many of the others combined. While this makes sense on the basis of population, it makes physical patrolling of space very difficult for the police officers overlooking larger areas."

Hamza further elaborated that each police station is divided by 'beats'. A beat is usually a main road that allows the police officer manning the beat (also called the beat officer) to see the maximum distance possible on either side of the road. A beat is also important because it is the basic geographical unit used to mark the location of any incident of crime. The data for incidence of crime is typically aggregated at the police station or beat level. However, both are too big as geographical units to be actionable for the police.

It soon became apparent to them that to identify hot spots they would require precise geo-coded crime locations that can be analysed spatially and viewed on a map. "The prob-

lem looks deceptively simple. One can just take all the addresses and plot them on a map GIS package,” explained Hamza. However, in the context of developing countries in general and Pakistan in particular, this task is riddled with several pitfalls. A standardised addressing scheme for recording consumer addresses does not exist, making the mapping of street addresses cumbersome and not scalable. Addresses themselves are recorded in ambiguous and incomplete ways. Thus, converting tabular crime data into a spatial visualisation is not easy.



To get around this problem, the team designed a system that allowed the police to map the exact location of a crime using smartphones. Initially the system was piloted in four high crime police stations in Lahore. Each of these four police stations was provided a smartphone that would allow them to tag the location of each crime using the phone’s GPS system. At the occurrence of a crime a police officer visits the crime scene and uses the app provided in the smart phone to tag and send the GPS coordinates of the crime to the servers. The exact location of the crime can then be immediately viewed on a map and used to pinpoint hotspots.



“This concept has now been scaled up by PITB and all 83 police stations in Lahore now report the location of their crimes in this fashion,” said Hamza exuberantly.

Other than the aim of reducing crime, there are two main threads that are currently being pursued. The first is to rigorously test if the theory of hotspot policing will yield dividends in this context. This is not known yet and Dr. Cheema at IDEAS is leading the project that will rigorously determine the efficacy of this paradigm by conducting a technological intervention in Lahore. The hope is that this intervention will conclusively prove the efficacy of this theory in Lahore. Secondly, it is expected that the police will become more comfortable in using technology which will allow them to understand crime better and devise strategies accordingly.

The Case for Trade Normalisation Between Pakistan and India

By Junaid Aftab



Dr. Syed Turab Hussain, Associate Professor, LUMS talked about the project 'Strengthening Research and Promoting Multi-Level Dialogue for Trade Normalisation between Pakistan and India' which analyses economic implications, including both benefits and costs, accruing to the stakeholders in the case of an increase in bilateral trade between Pakistan and India, if Pakistan were to award the Most Favoured Nation (MFN) status to India.

India granted Pakistan the status of the Most Favoured Nation (MFN) in 1986. Pakistan has not yet granted India the same status of the Most Favoured Nation (MFN), even though the last elected government, had in principle, decided to award India with this status. The project titled 'Strengthening Research and Promoting Multi-Level Dialogue for Trade Normalisation between Pakistan and India' is a collaborative research project that analyses economic implications, including both benefits and costs, accruing to the stakeholders in the case of an increase in bilateral trade between Pakistan and India if Pakistan were to also award the Most Favoured Nation (MFN) status to India. The research project was initiated by Adam Smith International when it contacted researchers at the Lahore University of Management Sciences (LUMS).

The team of LUMS researchers worked on this project under the supervision of the principal investigator, Dr. Mohsin Khan, a senior economist who is currently a Resident Senior Fellow at The Atlantic Council. The team from LUMS comprised of Dr. Syed Turab Hussain, Associate Professor; Mr. Usman Khan, Adjunct Faculty; Nazish Afraz, Adjunct Faculty; Nadia Mukhtar Syed, Teaching Fellow and Dr. Abid Imam Hussain, former Assistant Professor.

The research project was split into two phases. The first phase was initiated when the previously elected government made the decision to award India the status of the Most Favoured Nation (MFN). The first phase of the project was dedicated to producing a battery of research reports regarding the existing trade relations between Pakistan and India. "The list of the research reports produced includes a report on the types of non-tariff barriers India imposes on Pakistani exports; a paper related to the political economy of trade between India and Pakistan and a paper on the sectoral impact of trade that examined which sectors would potentially gain and which sectors would potentially lose, if a bilateral trade agreement was signed between the two countries. Two papers were also

produced on the experience of Sri Lanka and Bangladesh in trading with India under both the South Asian Free Trade Area Agreement (SAFTA) and bilateral agreements, and a paper on the legal aspects of trade," explained Dr. Hussain.

The second phase of the study that commenced a year ago focused on the sectors that were threatened under a potential free trade agreement between Pakistan and India. "Through our interaction with the stakeholders, we found out that the agricultural, the automotive and the pharmaceutical sectors were opposed to trade," mentioned Dr. Hussain. The second phase of the project subsequently focused on researching potential mechanisms and policy measures that could be implemented to alleviate the concerns of the aforementioned sectors.

The research team conducted a stakeholder analysis by conducting workshops with personnel from the three sectors, allowing the team to produce three comprehensive stakeholder analysis-based papers. "The main thrust of the second phase was to come up with solutions regarding the concerns of the three sectors. For example, for the agricultural sector, we sug-



gested a separate agreement. We found out that the Joint Business Council of India and Pakistan and the agricultural communities have signed an agreement and they are moving towards a separate agreement," said Dr. Hussain. "The second phase also had a broader paper that, using the Computational General Equilibrium (CGE) model and secondary information, looked at the broader impact of trade in terms of the effect on GDP growth, the trade balance and the employment rate, among other things," said Dr. Hussain.

The research project culminated in the Department of Economics at the Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS) holding an international conference on Pakistan-India Trade Normalisation at LUMS. The conference was attended by economic researchers at the LUMS Sustainable Development Policy Institute (SDPI), US Agency for International Development (USAID), Farmer Association of Pakistan (FAP) and the Indian Council for Research on International Economic Relations (ICRIER). Researchers from these institutes presented their research findings at the conference.

Dr. Hussain pinned down the importance of the findings of the research project by mentioning that, "Pakistan is going to benefit from this research project because it shows that for good policy-making the concerned institutions need objective analysis by experts in the relevant area." Dr. Hussain believes that the findings of the research project that were conveyed to the Ministry of Commerce and other institutions would help form a better public policy as policy makers would now be able to base their decision on evidence gathered from economic research.

Making and Shaping Contemporary Pakistan

By Ayesha Khurshid

Professor Dr. Mohammad Waseem at the Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS) is conducting research on the reasons of decline in Pakistan and the social and political factors affecting this trend. He aims to highlight the roles played by various groups and institutions in the country in order to provide policies that would improve the situation.

Pakistan is currently in a state where there is a crisis of governance. The reasons for its declining condition are several and could range from social to political but in order to move past what has become of our country, the underlying factors that caused this problem need to be identified

precisely. For this purpose, Dr. Mohammad Waseem, Professor at MGSHSS is doing research that is directed to 'look for policies and perspectives that can address issues of poverty, conflict between various contenders for power, discrimination on the basis of caste, class, creed and gender and backwardness in general.' These issues, he believes, when comprehensively addressed will provide a 'means of moving ahead in step with the world at large.'

Dr. Waseem has been writing conference papers on 'Indo-Pakistan relations: Social, cultural and political dimensions,' and Democracy and issues of governance in Pakistan. In addition to this, he is currently doing research work on his book which is about 'political conflict in Pakistan.' His area of research comprises 'ethnic, religio-sectarian, civil-military and electoral politics of Pakistan'. His current research also aims at exploring various fields of political life in the country including its constitutional, ideological, diplomatic, strategic and cultural factors. Dr. Waseem is continuously working towards researching relevant questions related to national life in order to move away from the current stunted growth that Pakistan is trapped in.

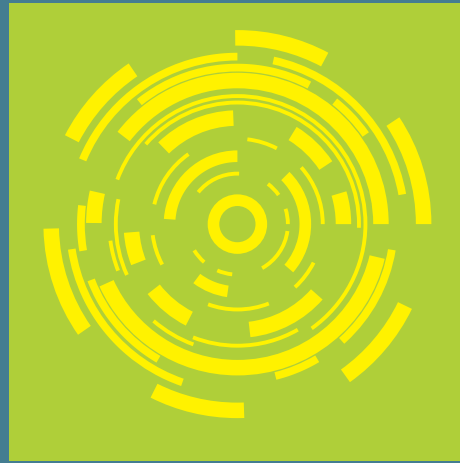
Dr. Waseem's research focuses on the 'makers and shapers of contemporary Pakistan' from which he goes on to evaluate the conflicts that have emerged among them. His research explores the reasons why there is a clash of institutions including the Judiciary, the Military and the Federal and Provincial Governments. He points to the contradictory forces at play in Pakistan such as the Muslim revivalist nationalism at one end and the secular state system inherited from the British at the other. Among other factors he includes Sunni majoritarianism and religious and sectarian minorities, in addition to Punjabisation of the state and resilience of ethno-nationalist movements. Dr. Waseem goes on to analyse how 'social forces' have been in conflict in different leading institutions when they try to affect policy and patronage. The





aim of his research is to understand to the underlying cause of these conflicts by exploring 'its expression through street demonstrations, mass media, and debate on the floor of the parliament, electoral campaign and political violence.' Moreover, his research also explains how sectarian wars in the Middle East, the Afghanistan imbroglio, and the tension in the Indo-Pakistan relations have provided the overall unstable regional context for conflicts at home.

Dr. Waseem applies social science methodology in his research to find 'destabilising aspects of the prevalent processes of social and political change on the one hand and resilience of certain medieval aspects of the tradition – about women, tribal hierarchy and bonded labour – on the other.' Rather than deriving policies on the basis of pure speculation and 'half - truths,' Dr. Waseem aims to lay bare the major currents of opinions and decision making so that his 'investigation into the myriad problems of the collective life of this country would be helpful in clearing the mist on the horizon while we move forward in terms of policy and profile.'



TECHNOLOGY

Control Strategies for Autonomous Off Road Robotics in Agriculture and Demining

By Rana Musa Tahir

minefield. The SBASSE team, consisting of no less than ten people, had worked prodigiously on this project over a span of two years. So it was a huge achievement when they won the competition, beating teams from countries all over the world.

The GAE (German Academic Exchange) lauded the team's efforts because despite the fact they used a low budget to make the Robot, it was at par with highly sophisticated ones made in internationally acclaimed labs around the world. Soon after they awarded Dr. Abubakr's team a grant of Euro 60,000 to build agricultural field robots in collaboration with TU Kaiserslautern. This project is what Dr. Abubakr is working on now.

Professor Karsten Berns from the German University, TU Kaiserslautern, has started an exchange programme with the faculty and students from LUMS and his own university. Every year, till the grant ends, two members of the faculty and three students will go to the German university to learn new techniques in Robotics. On this Agricultural and Demining project, 5 workshops have been held, 3 in Pakistan and 2 in Germany. These workshops and conferences gather people from all over the country in interactive sessions which are helpful to both faculty and students. Dr. Abubakr says that one workshop in particular, that was held in world famous Dagstuhl Research Centre in Germany was very successful. It was attended by researchers from internationally acclaimed robotics researchers, many of whom showed great interest in working with Dr. Abubakr in research projects.

The project "Control Strategies for Autonomous Off Road Robotics in Agriculture" focuses on exploring the possibilities of using low cost sensor systems for real-time mapping,

Assistant Professor, Dr. Abubakr Muhammad's team after their success in the NI Mine Detection Robot Design Contest in Lebanon, are now working in collaboration with TU Kaiserslautern to build agricultural field robots.

It all started in 2010, when Dr. Abubakr Muhammad's team participated in NI Mine Detection Robot Design Contest held in Lebanon. Sponsored by the National Instruments (NI) Planet NI initiative, the purpose of this contest was to bring awareness to the persisting problem of landmines and cluster bombs in Lebanon and the surrounding region by inviting researchers to design a robot for their detection. It was a great opportunity for engineering students to come up with new ideas and innovations in embedded and robotics systems while serving their local communities.

After passing the initial phases of the competition, the team reached the finals, which were conducted inside a military base, Lebanon Mine Action Center (LebMAC), on a real





localisation and navigation of an off-road mobile robot to be used in agriculture and mine-clearing purposes. More specifically, robust algorithms shall be developed for autonomous navigation in agriculture fields and demining in highly vegetated terrain. The focus of the research collaboration is on key navigational capabilities related to obstacle detection, terrain classification and path planning, which are required for the operation of autonomous outdoor robots in rough terrain. Combining the Pakistani partners experience in humanitarian robotic demining with the knowledge-base of off-road field robotics of the German side, robust and efficient solutions for outdoor robot navigation with low cost sensor systems in heavily vegetated terrain are expected.

Dr. Abubakr says that due to the success of this project and the efforts of his team at CYPHYNETS Lab, the interest of LUMS students in the field of robotics and automatic control has increased significantly. SBASSE now offers a wide range of courses in this field. A unique angle of his philosophy of robotics related research is that he is working on applications in water, agriculture, environment and sustainability that are most relevant to Pakistan. His PhD student Syed Muhammad Abbas is working on profiling canal channels for siltation by aerial drones. Another PhD student, Mudassir Khan studies path planning, exploration and perception of agricultural machines like lawnmowers. A third PhD student, Talha Manzoor has switched from robotics and mechatronics to solving problems related to optimal control of natural resources for sustainability. These students began their journey at LUMS with a Master's thesis at Dr. Abubakr's lab during the landmine robot project and are now venturing into bold ideas that simultaneously touch robotics, control theory, water and systems analysis, all in socially important contexts.



Other than the agriculture and demining projects that Dr. Abubakr is working on, he argues that there are a lot of other ways in which Robotics can be used. Environment, health and military related uses are a few of the many that he intends to work on.

Why Non-Tariff Barriers Just Don't Work

By Aisha Hamid

In a collaborative research paper, Uzair J. Kayani, Assistant Professor of Law and Policy and Sikander A. Shah, Associate Professor of Law and Policy at the Shaikh Ahmad Hassan School of Law (SAHSOL) expose the injurious side of non-tariff barriers and how they are detrimental to a developing country's economy. They explored and compared an exhaustive list of non-tariff barriers employed by China, India, and Pakistan and concluded that lowering trade barriers can increase the income of households, create new jobs and more efficiently reallocate investments in Pakistan.

Occasionally, trade restrictions are defended for being the saviors of domestic entrepreneurs. Assistant Professor of Law and Policy, Uzair J. Kayani and Associate Professor of Law and Policy, Sikander A. Shah at SAHSOL could not disagree more with this statement, and prove, by exposing the ugly side of non-tariff barriers, just how injurious they are to a developing country's economy.

Other than the two well-studied and well known damaging effects of non-tariff barriers i.e. the increased prices that consumers have to pay and the misallocation of investments, Professors Uzair Kayani and Sikander Shah, in their collaborative research paper, present a plethora of reasons why developing countries need to be wary of them.

For starters, a multitude of related markets that could have sprung up and flourished never do so because of restricting a good. The benefits of markets such as these, elaborates Prof. Kayani are "secondary markets in the goods, markets in customisation or spare parts, markets in services related to the good, markets in complements to the restricted good, and markets in financing etc," which could generate new jobs, end up being grossly underrated. By keeping the non-tariff barriers at arm's length, a country does its economy and its domestic entrepreneurs a favour; the restricted good can be a hinge for the inception of new ideas for businesses or products. Thus, the restricted good can do more than engender potential markets; its intangible benefits know no bounds. When trade restrictions pose a threat to the creation of such markets and ideas, they become guilty of plunging not

only entrepreneurs into harm's way, but also consumers and investors, and ultimately become barriers to modernisation.

Using the statutes in India, Pakistan and China, the WITS/TRAINS database of the World Bank, and country reports from the United States trade representative, inter alia, Professors Uzair Kayani and Sikander Shah have investigated deeply and intensely, to prepare an exhaustive list of non-tariff barriers employed by China, India and Pakistan. The team has also examined the industries which bear the detrimental effects of the non-tariff barriers, and have diligently taken into account the political forces that either support or oppose free trade in each of these countries. As a result, they have concluded that Pakistan's economy is relatively more open than India's and China's.

With this discovery of Pakistan's relative openness to trade, the two professors expect a greater "lowering of trade barriers to increase the discretionary income of households, create new jobs, and more efficiently reallocate investments in Pakistan." Moreover, through the findings of this research paper, Professors Uzair Kayani and Sikander Shah hope to "engage with policymakers and other stakeholders to educate them in the effects of trader policy, and to learn their concerns about Pakistan's current trade regime."



Prof. Uzair Kayani



Prof. Sikander Shah

Reducing Response Times for the LUMS Emergency Medical Services

By Ayesha Aslam

LUMS Emergency Medical Services (EMS) launched an Android application for their Medical First Responders in order to decrease response times for on-campus emergencies. EMS first responders provide pre-hospital treatment for injuries ranging from the minor to major. Certified in first aid and CPR, the EMS team responds to calls for medical assistance by the LUMS community.

LUMS Emergency Medical Services (EMS) is the first initiative of its kind at a Pakistani university. Established in 2009, EMS, in collaboration with Rescue 1122, is organised, managed and run by LUMS undergraduate student volunteers who are trained and certified in First Aid and CPR to serve as Medical First Responders (MFRs) to any medical and trauma emergency that occurs on campus. LUMS EMS responds to all calls for medical assistance at any time of the day, throughout the academic year.

By having a round the clock student EMS service, LUMS has joined the ranks of many leading universities in the US and elsewhere who offer such a facility to their campus communities. The LUMS community relies on EMS first responders in emergencies to provide pre-hospital treatment for various emergencies ranging from bruises to fractures.

Always on the lookout for improving response times, LUMS EMS launched an Android application for its members in 2013. All EMS Medical First Responders have the application installed on their cell phones, which informs them of those on duty at any point during the day. The LUMS EMS Database App was created keeping in mind the need to have an on-the-go database of Medical First Responders who can be called at the tap of the screen. Previously MFRs



would have to carry paper copies of duty schedules and phone numbers with them at all times in case they needed to contact anyone during an emergency.

Now with the application, MFRs can easily find out who is on duty and the way to contact them quickly. The LUMS EMS application has greatly reduced response times to an average of 3-5 minutes, resulting in greater overall efficiency of the department.

The idea was conceived by Ahmed Zafar, a graduate of the Class of 2014, in the summer of 2012 while he was working on some search algorithms for a computer course assignment. Ahmed Zafar is a Political Science major and has a minor in Computer Science. Explaining how proud he felt of his work at EMS, Ahmed said, "I consider it to be one of my defining achievements here at LUMS and am enormously proud and grateful for the chance to be able to create such software which ultimately will allow EMS to better perform its duties. There was a lot of hard work involved, especially during the final weeks where on average I was working on the app for 10-12 hours a day, daily. Ultimately, it was all definitely worth it. The app now has its own place on the LUMS Portal which will allow restricted access to EMS members shortly. Planned improvements include a more efficient and smaller app."

EMS training involves one semester of rigorous training, lectures and demonstrations. These are followed by practical evaluations. The potential MFRs spend the second semester on probation, where they have duty hours and work with senior MFRs on the field. Speaking about the EMS team, President of LUMS Emergency Medical Services, Norin Yasin Chaudhry said, "There are currently more than 40 MFRs who have had training. We are now training another two batches on weekends and weekdays and are hoping for another 60 to be ready after a year of training."

Speaking of the working of the LUMS EMS application, Norin explained, "Currently there are two menus on the application for MFRs on duty. The names of all MFRs along with their phone numbers are displayed. The duty roster for the EMS team is made at the beginning of the semester and can be viewed through the application as well."

Ahmed Zafar is working on new features and updates for the EMS application. He is working on a way to make it more user friendly, so that it is easier for anyone to update the schedules. Other possibilities include adding an emergency form on the app itself, through which MFRs can update the team on emergencies responded to and other details.

A Primary Care Toolkit to Tackle Child Labour and Promote Health Equity

By Ayesha Khurshid

Dr. Muhammad Farooq Naseer, Assistant Professor at the Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS) collaborated in an international research study to examine the health consequences of child labour to design a toolkit for primary care workers. The research aimed at understanding the medical problems involved regarding this controversial issue and the medical facilities that are currently available so that a more fitting health care solution could be found.

Child labour, being one of the most criticised issues in today's era, is one of the most common problems that prevail in the developing countries of today. By working in less than ideal places come the hazardous effects it has on the vulnerable nature of children. The lack of attention paid to this concern is astonishing along with the fact that the current public health system fails to provide equitable health facilities to the

various proportions of the population. Dr. Muhammad Farooq Naseer, Assistant Professor at MGSHSS approaches this serious predicament by collaborating in "an international research collaboration to study the health consequences of child labour to design a toolkit for primary care workers to address this problem."

This particular study was hosted by Dr. Anne Andermann of McGill University's Department of Family Medicine. The research was conducted in countries with an ample prevalence of child labour, which included Pakistan, Niger, Brazil and Bangladesh. Dr. Farooq Naseer; Muazzam Nasrullah, University of West Virginia and Centers for Disease Control, USA and Saeed Awan, Director, Center for Improvement of Working Conditions and Environment, were part of the team which conducted the research in Pakistan through LUMS. The team at McGill University designed all the research protocols for IRB approvals and ensured the development of the work plans in all of the participating countries. The team in Pakistan molded this plan so that it was ideal for its local context in addition to obtaining the necessary approvals to carry out the study.

The research, which comprised of extensive on-field data, consisted of thorough qualitative surveys carefully selected so that they differed in socioeconomic and occupational characteristics. The surveys were directed towards various agents who could highlight the health impacts of child labour. The research was successful in highlighting the hesitancy and restrictions that children encompassed by child labour faced when accessing health facilities. Additionally, 'frontline health care providers often accessed by these children, such as doctors, dispensers, lady health workers, vaccinators and hakims' were also taken into account to provide the perspective of the caregiver regarding the solution to these health problems to ensure the toolkit designed would be suitable for both the patients and the caregivers. The research was aimed at understanding the various medical problems involved regarding this controversial issue and the medical facilities that are currently available so that a more fitting healthcare solution could be established to address these concerns.

Dr. Naseer explained that the current basic healthcare system in Pakistan focuses primarily on 'preventive care, treatment of minor ailments and referral to secondary and tertiary care facilities for complex cases.' He believes that since child labour has negative consequences on the health of children, there is minimal awareness of this problem as the present healthcare system is ignorant of these concerns.

According to Dr. Naseer, more attention is being paid to vaccination and neonatal care, which sets out to target pregnant women and infants rather than focusing on the hazards of child labour. The consequences of child labour can be extreme and can range from physical to psychological which begs the healthcare systems to address these ever-demanding apprehensions. This research is, therefore, a leap towards a better solution to this issue, as both the public and private healthcare systems have not been able to take a hold of the situation. Dr. Naseer is of the opinion that since child labour is illegal practically everywhere in the world, the current healthcare system will fail to not only acknowledge its presence but tackle the medical issues it brings and he, therefore, aims 'to change that by developing and piloting a health equity toolkit which would sensitise the primary healthcare workers about the problem and its possible solutions.'



Internationalisation of Manufacturing: The State of Pakistani Firms

By Nimra Arshad

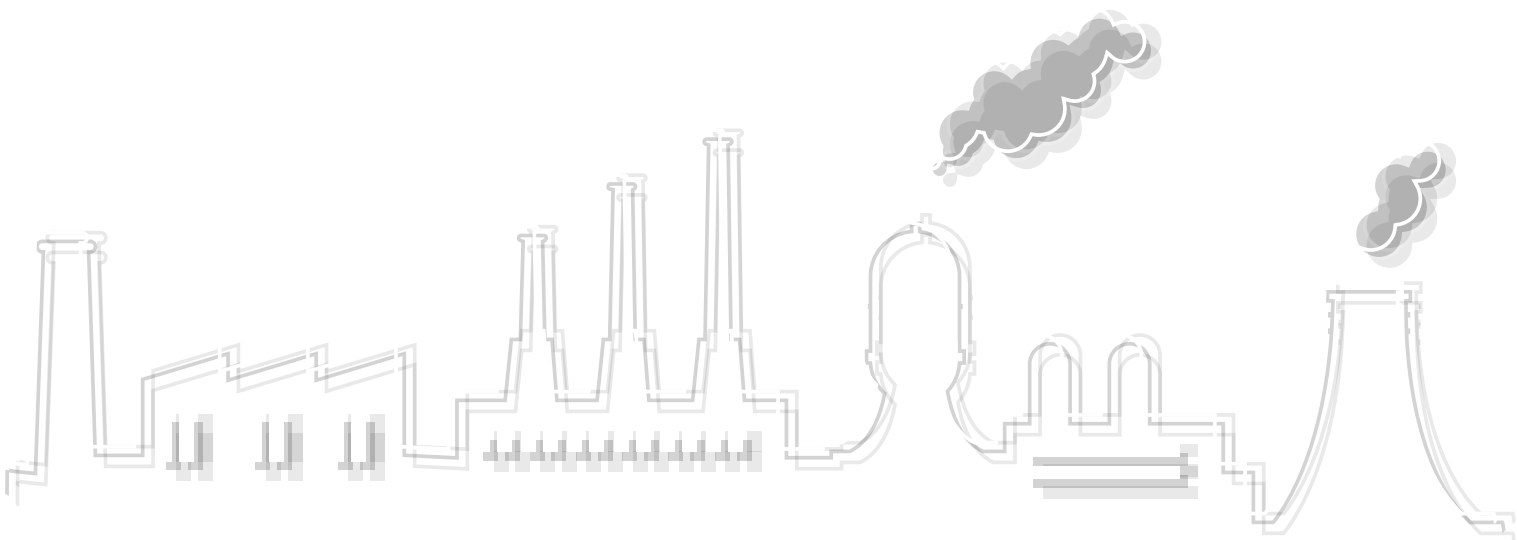
Suleman Dawood School of Business (SDSB) faculty, Dr. Kamran Ali Chatha, Associate Professor and Dr. Shakeel Sadiq Jajja, Assistant Professor have worked on a research paper to explore how manufacturing firms in developing countries like Pakistan can internationalise their manufacturing and innovation capabilities. The study conducted aims to demonstrate ways in which manufacturing firms can develop their potential to enhance capabilities and benefit from a wide range of international opportunities.

Increased globalisation of manufacturing indicated by offshoring of manufacturing and innovation to 'low cost' countries has shown increased production activity in the developing countries. Accordingly, the manufacturing capabilities and innovation potential in developing countries has improved. SDSB faculty, Dr. Kamran Ali Chatha, Associate Professor and Dr. Shakeel Sadiq Jajja, Assistant Professor have collaborated to author a paper to investigate the readiness of manufacturing firms in developing countries like Pakistan to internationalise their manufacturing and innovation capabilities and the strategies deployed for this purpose. This study is aimed to develop a set of internationalisation requirements of manufacturing firms and determine the extent to which manufacturing firms in Pakistan are ready to meet these requirements. The study will also propose a roadmap of capability development for Pakistani firms to internationalise their manufacturing and innovation potential.

According to Dr. Chatha, this research will be extremely relevant to Pakistan, particularly to chambers of commerce for pursuing those elements that underpin internationalisation and secondly, local firms in developing their potential to internationalise capabilities. Pakistan's economy is currently striving hard for increased international contact, both in terms of gaining useful international investment and making inroads into lucrative international markets. Foreign exchange, which is highly critical for the well-being of Pakistan's economy, is generated through exports. If the export-oriented industry is enhanced in Pakistan, it will only serve to increase the amount of foreign exchange coming into the country and help boost the economy. The Pakistani market is being marked out as an area of interest by a large number of international firms and there is wide range of opportunities for it to expand and grow. This research, with its main aim to establish standards for internationalisation for Pakistani firms, will be a step forward as the Pakistani economy strives to flourish.

The research study is conceived to be a survey based type research. As a result of literature review as well as detailed interviews with some leading manufacturing firms, a set of requirements for internationalising manufacturing and innovation capabilities will be established. Consequently, a surveying instrument will be developed and conducted with about 200 firms. This research, according to Dr. Chatha, is hinged on establishing close linkages with leading Pakistani manufacturers. Further data analysis shall then reveal the extent to which Pakistani manufacturing firms are ready to internationalise their capabilities.

Dr. Chatha plans to eventually culminate his research into a course for LUMS. “International manufacturing is a new stream of research in the literature and the need is being felt in the academia to teach this to students and in industry to understand and employ its concepts. Very few scholarly studies are available at the moment. The frameworks and theories are not developed yet either. This embryo project can turn into a set of studies for next few years to pursue and develop this new area of study and practice,” he said. No business school in Pakistan is currently teaching a course focusing on international manufacturing and Dr. Chatha hopes that the introduction of such a course will be a source of distinction and pride for the Suleman Dawood School of Business at LUMS.



Umar Suleman

PhD Computer Science



LEARNING FROM DEMONSTRATION IN ROBOTS USING THE SHARED CIRCUITS MODEL

"In the course of this research I basically did two things: 1) Brought a viable theory from cognitive psychology to address learning from demonstration in robots into the realm of robots; 2) Implemented it on mobile robots where one robot learns boundary patrolling in an enclosed area. The most important thing is achieved already i.e. I have developed a better understanding about the subject area. I hope that I can convert this capability in solving real problems that society appreciates.

I intend to utilise my subject knowledge to disseminate the sound basis of robotics and allied fields to students to produce, in the longer run, a critical mass of problem solving roboticists; robotics experts that solve real problems of Pakistan."

Talat Nazir

PhD Mathematics

EXISTENCE AND UNIQUENESS OF SOLUTIONS OF OPERATOR EQUATIONS WITH APPLICATIONS

"My work is to find the techniques for solving nonlinear systems by employing some nonlinear operators and presenting their applications which is very useful. Various problems of a practical nature arising in physics, chemistry, biology, economy, social sciences, etc. can be modelled using a certain mathematical setup. Such models give rise to a variety of equations or a system of equations. The problems become more sophisticated when one deals with operator equations where the unknown object is an operator acting between two abstract spaces of different kinds. While exploring solutions of such equations, some fundamental questions arise: Does there exist a solution? How can the solution be constructed? How many solutions are there? What is the structure of the set of all solutions? Problem of existence of solutions becomes equivalent to the problems of finding a fixed point of a certain operator. Hence results from fixed point theory can then be employed to obtain the solution of operator equation. Banach's contraction principle is broadly applicable in proving the existence of solutions to operator equations, including the ordinary differential equations, partial differential equations and integral equations. This principle has been generalised in many directions.



I now have about 39 international publications, world wide, of my work and one international book has been published from Germany. Moreover, I have presented my work in the Netherlands, Italy, Thailand and Turkey. I have also received an invitation from American Mathematical Society to present my research work in the Joint Mathematical Meeting to be held on January 10-13, 2015 at the Henry B. Gonzalez Convention Center in San Antonio, Texas, USA.

My research work will be very useful and helpful to solve various problems faced in the field of economics, physics, chemistry, engineering, social sciences etc. So in Pakistan, many researchers and graduate students can use my work to solve problems arising in their fields. Furthermore, the industries in Pakistan can optimise their products and gain maximum profit by employing the techniques that I have produced in my research work."

Shakeel Sadiq Jajja

PhD Management

SUPPLY CHAIN MANAGEMENT AND ORGANISATIONAL PERFORMANCE: STRATEGY AND INNOVATION ASPECTS



"Supply chain strategy is widely recognised as a crucial part of an organisational strategy. Supply chain strategy, organisational functions related to supply chain partners and performance are important issues in supply chain management research. However, the foundation of various aspects of supply chain strategy, such as quality focus and innovation focus, and their relationships with functions of supply chain partners is less known. Similarly, the structure encompassing the supply chain strategy, organisational objectives and functions, and various organisational performance measures require a better understanding.

This dissertation proposes a macro-structured framework to describe the relationships among organisational supply chain strategy, objectives, internal and external functions, as well as performance. It limits the scope of empirical inquiry to three complementing theoretical themes that stem from the macro research framework. Firstly, the dissertation seeks to establish and validate a theoretical model linking a multi-aspect supply chain strategy construct, core operational functions (such as process management and product development), and organisational performance. Secondly, the dissertation attempts to establish a relationship extending from supply chain strategies (lean and responsive) to supplier functions (supplier quality, cost effectiveness, flexibility, and delivery reliability), which in turn impact buyer performance. Thirdly, the dissertation proposes a model that links innovation-focused supply chain strategy and performance. The third model argues for a positive impact of supply chain innovation strategy on innovative buyer-supplier relationship (covered by the constructs supplier focus, buyer-supplier innovation intent, and buyer-supplier innovation structure) leading to enhanced product innovation, which in turn has positive impact on business performance. Additionally, the dissertation seeks to explore the linkages between organisational demographics and product innovation.

The dissertation improves theoretical understanding and removes managerial ambiguity as to what constitutes supply chain strategy and how it impacts organisational operations both in-house and at the supplier end, which in turn impact performance on multiple fronts. The findings suggest that an alignment of supply chain strategy with internal and supplier functions improves cost, quality, delivery, flexibility, and product innovation outcomes, leading to enhanced buyer performance. Hence, it makes good business sense for managers to align supply chain functions with supply chain strategy for performance improvement. Moreover, the relationship of demographic variables with product innovation provides insights into how the organisational context can nurture product innovation.

This dissertation provides a platform for several future research endeavours. For example, the future research can extend the empirical investigation of the three theoretical models presented here in another empirical setting using quantitative or qualitative research approach. Moreover, the future research can empirically investigate the contingency effects of the demographic variables on the hypothesised models presented here. Finally, it would be interesting to proceed with an in-depth analysis of any significant differences between the Pakistani and Indian companies."

Ijaz Akhtar

PhD Computer Science



MODELING SPATIOTEMPORAL REGULARITY IN DEFORMABLE STRUCTURES

“In computer vision and computer graphics, we often represent the objects such as faces, cloth, and bodies as time-varying point clouds in problems like animation, simulation, and tracking. A common difficulty in solving these problems is how can we avoid the invalid solutions and preserve the naturalness of the objects.

In my PhD we propose models to preserve the spatial and temporal regularities of objects and demonstrate their effectiveness in solving a number of problems. In particular, we show that our models can be used to estimate the 3D structure of time-varying objects from a single video. Another application of our models is in Motion Capture, a system to record the actions of humans in 3D and extensively used in film-making and game development. We develop tools for motion capture clean-up and demonstrate drastic reduction of time from several hours to a few minutes for this process.

My research was published at top-tier conferences and journals of computer vision, computer graphics and machine learning. My first paper was an oral presentation at the conference, "Neural Information Processing Systems" with a selection rate of less than 2% and was also one of the nominees for the best student paper award. In less than five years this paper and its follow-up journal paper has got more than 100 citations. My work was also presented at Siggraph 2012, the most prestigious conference in Graphics. Disney Research Pittsburgh, the place I worked during my internship, has also filed a patent on this work.

I hope that our models are widely applicable to several other interesting problems in computer vision and computer graphics. They have been well-received by the research community and some researchers have already used them effectively. I hope that in long-run my research will have an impact on the computer vision and related fields.

Given the current socioeconomic situation of Pakistan, my research may not have a direct benefit to Pakistan but it should have several indirect benefits. The first benefit might be a little bit of recognition at the prestigious venues of my publications. Several of these were introduced to a paper from Pakistan for the first time. I think my work should improve the research culture in Pakistan. It will hopefully give the people the courage to attempt difficult problems. Hopefully in future, a workforce can be formed to solve practical and industrial problems."

Muhammad Abdur Rahman Malik

PhD Management

REWARDS AND CREATIVITY - THE NEXT STEP

"I have worked for more than eight years in the corporate sector and during these years I realised the importance of employees' motivation, commitment and generating out of the box, novel ideas. The interest that I developed for these topics during my years in industry compelled me to select this topic for my PhD dissertation.

In my dissertation I analysed the impact of various types of rewards (such as financial, non financial, extrinsic, intrinsic etc.) on the creative behaviour of employees. I also explored some factors related to employees' personality (such as locus of control, self efficacy, goal orientation etc.) and the context in which they work (such as organisational climate, supervisory style etc.) on the relationship between rewards and creativity.

With the business environment becoming more and more competitive, creativity of employees has become not only a competitive advantage, but a recipe for long term success. The results of my research can help managers to use rewards more effectively for enhancing creative behaviour of their employees. The results also guide managers about creating an environment that is more conducive for creative behaviour. Finally, the research informs about rewards that can snub creative behaviour of employees. My research is equally applicable for managers in Pakistan and hence the benefits mentioned are available for Pakistani organisations.

On a personal level, I wish to publish my research in top quality journals. One of my articles has already been accepted at the 'Journal of Organizational Behavior,' which is considered to be one of the best journals in the fields of OB and management. I also took part in the ISPIM Dissertation Award 2014 (the award is given to the best PhD dissertations on Innovation and Creativity). This year more than 130 PhD dissertations from about 40 different countries took part in this competition. My dissertation was selected as one of the three prize winners and was declared as the final runner-up. "



Muhammad Bilal

PhD Electrical Engineering

STATISTICS-INSPIRED HARDWARE ARCHITECTURES FOR IMAGE AND VIDEO PROCESSING

Khurram Nazir Junejo

PhD Computer Science

TERM DISCRIMINATION BASED ROBUST TEXT CLASSIFICATION WITH APPLICATION TO EMAIL SPAM FILTERING





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