# Sustainable Development in a Digital Society

*Editors*
Uzma T. Haroon
Imrana Niazi
&
Sarah Siddiq Aneel

SDPI
Sustainable Development Policy Institute

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**Sustainable Development Policy Institute**

Taimur Chambers, # 10-D (West), 3rd Floor
Fazl-e-Haq Road, Blue Area, Islamabad
Tel: (92-51) 2278134, 2278136 Fax: 2278135

**&**

**Sang-e-Meel Publications**

25 Shahrah-e-Pakistan (Lower Mall), Lahore-54000 PAKISTAN
http://www.sangemeel.com e-mail: smp@sangemeel.com

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# ABOUT THE SUSTAINABLE DEVELOPMENT POLICY INSTITUTE

## CHARTING THE COURSE OF RESEARCH EXCELLENCE

Born on 4 August 1992 in a small office in the capital of Pakistan, with a handful of dedicated employees, the Sustainable Development Policy Institute (SDPI) is now known as Asia's leading non-partisan policy research organisation providing the global development community representation from Pakistan and the region as a whole. Over the past 28 years, it has remained staunchly committed to the mission it set for itself upon inception:

**To catalyse the transition towards sustainable development, defined as the enhancement of peace, social justice and well-being, within and across generations.**

SDPI remains one of the few organisations in Pakistan that has been consistently ranked internationally by the Global Go To Think Tank Index since 2016.

## WHERE WE COME FROM

The Institute's genesis lies in the Pakistan National Conservation Strategy (also known as Pakistan's Agenda 21), which approved by the Federal Cabinet in March 1992, outlined the need for an independent non-profit organisation in the country to serve as a source of expertise for policy analysis, evidence-based research and training services.

## WHAT WE DO

SDPI functions in an advisory capacity by carrying out robust research, policy advice and advocacy; and in an enabling capacity by strengthening other individuals and organisations with resource materials and training. Specifically, the Institute's broad-based yet holistic mandate is to:

- conduct evidence-based research, advocacy and trainings from a broad multidisciplinary perspective;
- promote the implementation of policies, programmes, laws and regulations based on sustainable development;
- strengthen civil society and facilitate civil society-government interaction in collaboration with other organisations and activist networks;
- disseminate research findings and public education through the media, conferences, seminars, lectures, publications and curricula development; and,
- contribute to building national research capacity and infrastructure.

## How We Do It

The diverse array of projects and programmes - from inclusive economic growth to institutional governance; from trade, regional connectivity, energy economics to climate change; from food, water and human security to education; from sustainable industrial growth to hazardous waste management; from religious tolerance to peace and gender equity, that SDPI has been involved in over the past 28 years, outline the following core activities:

- Providing policy advice to the government.
- Facilitating and organising forums for policy dialogue.
- Supporting in-house, local, regional and international academics, students and researchers.
- Publishing critical research for public and private sector use.
- Acting as a conduit for North-South and South-South dialogue.
- Creating an environment for information dissemination and training.
- Campaigning for regional advocacy and networking.

## Why We Do It

The Institute's efforts remain unwavering in its vision to become a Centre of Excellence on sustainable development policy research, capacity development and advocacy in the country and in Asia by producing knowledge that not only enhances the capacity of the state to make informed policy decisions, but also engages civil society and academia on issues of public interest for the betterment of current and future generations.

## How We Reach Out

Since its inception, SDPI has organised innumerable seminars and national and international conferences. The Sustainable Development Conference (SDC) series has become a flagship event of the Institute that not only provides a forum for highlighting SDPI's own research, but also offers space to other academics from South Asia in particular and across the globe in general, to share their work and engage in constructive dialogue with fellow intellectuals, movers and shakers from the public and private sector, students and the general public.

To date, SDPI has organised ***twenty-two annual conferences***. This collection, of scholarly papers, speeches, working papers, and policy briefs, was presented at the 22nd SDC held over a four-day period from 2-5 December 2019 in Pakistan's capital Islamabad (see Annexure for Conference Panels at a Glance).

# ABOUT THE SUSTAINABLE DEVELOPMENT CONFERENCE (SDC) SERIES

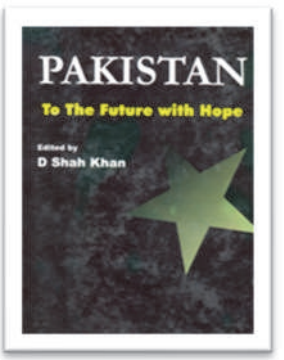
## INTRODUCTION

The Sustainable Development Policy Institute (SDPI) has been organising a series of Sustainable Development Conferences (SDCs) since the inception of the Institute. The first SDC was held in 1995. After every SDC, the Institute publishes peer-reviewed research work in the form of an anthology. The anthologies are, in fact, an outcome of the deliberations and discussions held during the different panels at their respective SDCs. Following is a brief history of past SDCs and their outcomes:

## FIRST SDC (1995)

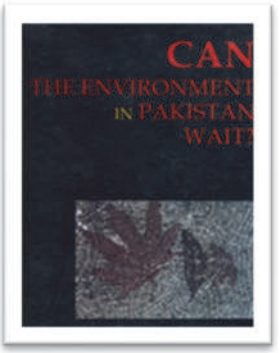

The First SDC titled **The Green Economics Conference** focused on the interaction between economics and environment. It included research papers on trade, fiscal policy, Environmental Impact Assessments (EIAs), green accounting, forestry, energy, industry, and urban environment. After this conference, an anthology titled *Green Economics* was published.

## SECOND SDC (1996)




The Second SDC highlighted the broad theme of sustainable development, including pollution abatement, resource management, conservation of biodiversity, the transfer and use of technology, trade and environment, human development and poverty alleviation, and social capital and governance. The conference was successful in highlighting key issues facing Pakistan and bringing out the latest thinking and analysis to identify solutions. The anthology produced as a result of the conference is titled *Pakistan – To The Future with Hope.*

## THIRD SDC (1998)

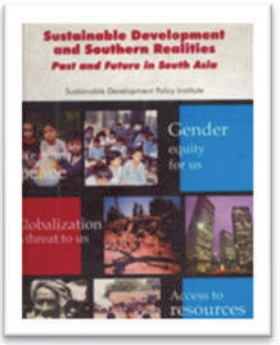



The theme of the Third SDC was **A Dialogue on Environment and Natural Resource Conservation**. The conference focused on stimulating dialogue on practical policy options for key environmental challenges being faced by Pakistan. The two broad thematic areas of Urban Environment and Natural Resources concentrated on urban pollution, water resource management, deforestation and sustainable agriculture with presentations by experts from Pakistan and South Asia. The anthology produced as a result of the conference is titled *Can the Environment in Pakistan Wait?*

## FOURTH SDC (2000)

The Fourth SDC titled **Discourse on Human Security** mainly focused on the changes and improvements in government policies and practice with regard to human security. The conference was designed to create awareness among senior policymakers, key federal and provincial government officials and civil society groups like the media and non-government organisations on security issues.

## FIFTH SDC (2002)

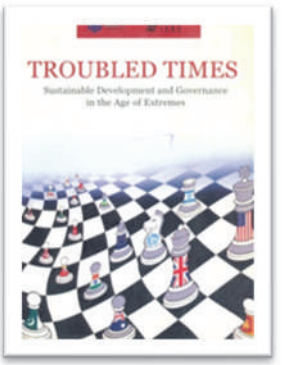



The Fifth SDC titled **Sustainable Development and Southern Realities: Past and Future in South Asia** re-examined the conceptualisation and implementation of sustainable development in its multiple dimensions: economic, political, social, and moral. The delegates scrutinised and consolidated some of the ideas presented at the World Summit on Sustainable Development in Johannesburg, and resituated debates in the South Asian context. The anthology produced as a result of the conference is titled *Sustainable Development and Southern Realities: Past and Future in South Asia*.

## SIXTH SDC (2003)

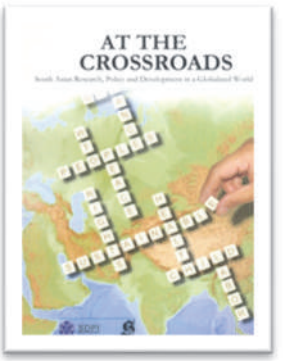

The overarching theme of the Sixth SDC was **Sustainable Development: Bridging the Research/Policy Gaps in Southern Contexts**. It focused on the problematique of knowledge production in the South. It explored policy/research gaps in two directions: in some places policy needs to be fed by better research; while in others, policy needs to take better account of existing solid research. It focused on the ways and means for translating this knowledge into effective policy initiatives locally, nationally, regionally and internationally by identifying the multiple gaps between research and policies in different sectors. The anthology which came out as a result of this SDC is titled *Sustainable Development: Bridging the Research/Policy Gaps in Southern Contexts*.

## SEVENTH SDC (2004)



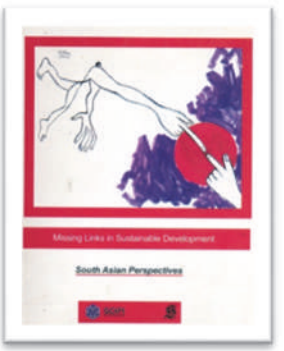

**Troubled Times: Sustainable Development and Governance in the Age of Extremes** was the overarching theme of the Seventh SDC that took up the key questions such as whether there is sound governance around development and whether this is ensuring just development? Whether there is more sharing of resources, including natural and institutional? Is there a strengthening of regional and international institutions? How much progress has been achieved in South Asia vis-à-vis governance? Is government more transparent today than it was a decade ago? Have governments kept their promises to the marginalised, whether the poor, women or minorities? The anthology that came out as a result of this SDC is titled *Troubled Times: Sustainable Development and Governance in the Age of Extremes*.

## EIGHTH SDC (2005)



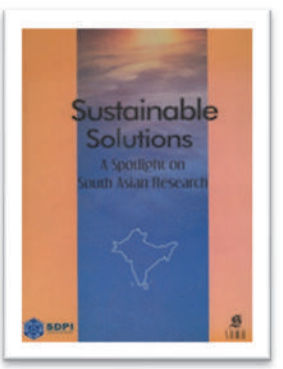

The Eighth SDC titled **At the Crossroads: South Asian Research, Policy and Development in a Globalized World** examined the multiple facets of sustainable development in the context of South Asia. The speakers discussed how problems and issues in South Asia could be dealt effectively at various levels based on prior experience of successful policy interventions. The anthology that came out as a result of this SDC is titled *At the Crossroads: South Asian Research, Policy and Development in a Globalized World*.

## NINTH SDC (2006)



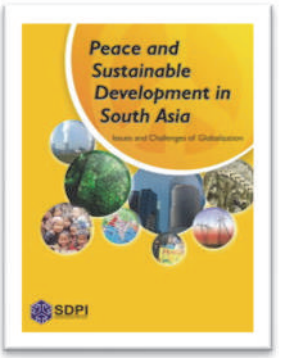

The Ninth SDC titled **Missing Links in Sustainable Development (SD): South Asian Perspectives** aimed at identifying the missing links in sustainable development for South Asia and proposed fillers for those. The region's pool of cutting-edge academics was tapped and top researchers invited together with policymakers, activists and other relevant stakeholders for a vibrant three-day debate. The anthology that came out as a result of this SDC is titled *Missing Links in Sustainable Development (SD): South Asian Perspectives*.

## TENTH SDC (2007)



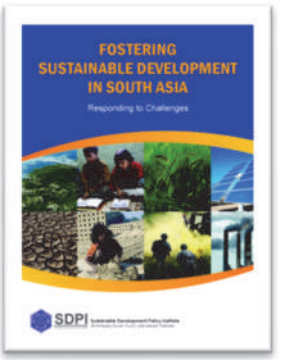

The Tenth SDC titled **Sustainable Solutions: A Spotlight on South Asian Research** explored sustainable solutions to problems such as poverty, illiteracy, mortality and morbidity, environmental degradation and disaster management, gender inequality, insecurity, violence and history. It focused on looking at both innovative solutions, as well as indigenously developed alternatives that have survived generations of development. The anthology that came out as a result of this SDC is titled *Sustainable Solutions: A Spotlight on South Asian Research*.

## ELEVENTH SDC (2008)




**Peace and Sustainable Development in South Asia: Issues and Challenges of Globalization** was the theme of the Eleventh SDC which discussed various issues such as where we stand in solving the dilemmas of inequality, poverty, climate change and energy scarcity, natural resources degradation, trade liberalisation policies, food insecurity, violence and conflict, re-writing history, and poor governance. The conference aimed to explore how resolving some non-conventional security threats may turn into added dividends for peace. The anthology that came out as a result of this SDC is titled *Peace and Sustainable Development in South Asia: Issues and Challenges of Globalization*.

## TWELFTH SDC (2009)




The Twelfth SDC titled **Fostering Sustainable Development in South Asia: Responding to Challenges** focused on the six 'Fs' crises - issues related to food, fuel, frontiers, functional democracy and the fragility of climate. Scholars from South Asia and other regions were invited to delve further on these issues and shared with the audience where South Asia stands today vis-à-vis coping with the six 'Fs' crises facing the region. Gender remained a crosscutting theme. The anthology that was published as a result of this SDC is titled *Fostering Sustainable Development in South Asia: Responding to Challenges*.

## THIRTEENTH SDC (2010)


The Thirteenth SDC titled **Peace and Sustainable Development in South Asia: The Way Forward** deliberated on how economic challenges could be handled with positive results in terms of natural resources, while at the same time increasing the capacity and effectiveness of institutions. The panels covered themes such as post-flood situation in Pakistan, food insecurity, energy and financial crisis, the issue of land acquisition, trade and financial liberalisation, social protection, the eradication of violence against women, the role of think tanks in peace and sustainable

development, sound management of chemicals, climate change, religious diversity, labour issues, etc. The anthology published as a result of this SDC is titled *Peace and Sustainable Development in South Asia: The Way Forward*.

## FOURTEENTH SDC (2011)


The Fourteenth SDC titled **Redefining Paradigms of Sustainable Development in South Asia** featured a broad spectrum of themes: livelihood, governance, literature, Sufism, poverty, geopolitics, forest management, REDD+, social accountability, 18th Amendment, land rights, food security, education financing, feminism, economic non-cooperation, water governance, and, energy and sustainability. The anthology published as a result of this SDC is titled *Redefining Paradigms of Sustainable Development in South Asia*.

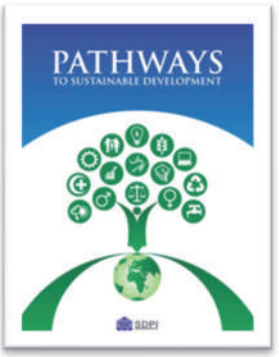
## FIFTEENTH SDC (2012)


The Fifteenth SDC **Sustainable Development in South Asia: Shaping the Future** analysed how things will look 20, 30 or even 50 years from now, threw light on issues that will be looming large, made concrete suggestions on how to overcome future challenges, and, gave practical policy recommendations about a sustainable South Asia. The anthology published as a result of this SDC is titled *Sustainable Development in South Asia: Shaping the Future*.

## SIXTEENTH SDC (2013)

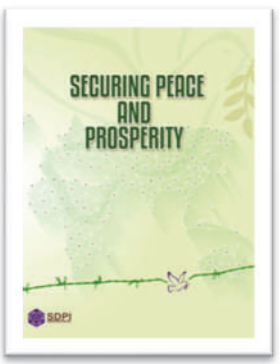

**Creating Momentum: Today is Tomorrow** was the theme of the Sixteenth SDC, which highlighted our present position and inclination to forecast and potentially modify our decisions that may improve our tomorrow. Under various sub-themes, the conference brought to attention that failure to act urgently is premised on the argument that waiting for another tomorrow for action will result in wasting opportunities that may not be available ever again. The anthology published as a result of this SDC is titled *Creating Momentum: Today is Tomorrow*.

## SEVENTEENTH SDC (2014)




The Seventeenth SDC titled **Pathways to Sustainable Development** looked at leadership change in China, Pakistan, Iran, Bangladesh, India, and Afghanistan that could hold the key to shaping development pathways in South Asia. The region needs political and executive leadership that has a commitment to strategise for peace and human security and raise tangible safeguards for the political economy of the region, while engaging with the primary stakeholders, i.e. the people. In this backdrop, issues of climate change, migration, sustainable and inclusive economic growth, sharing energy resources across the region, environmental challenges, food security, human rights, women in the peace process, and regional connectivity were discussed and published in its peer-reviewed anthology titled *Pathways to Sustainable Development*.

## EIGHTEENTH SDC & EIGHTH SAES (2015)

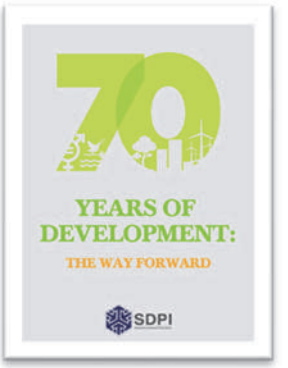



The Eighteenth SDC titled **Securing Peace and Prosperity** had a thinkers' agenda, a gathering of regional think tanks working closely with policymakers of their respective countries and representatives of existing and potential South Asian Association for Regional Cooperation (SAARC) member countries - a congregation of visionaries in Islamabad. It focused on understanding regional integration and the attempt of SAARC countries at various forums in 2015 to establish new corridors to achieve sustainable development in the region and beyond. Simultaneously, the Eighth South Asia Economic Summit (SAES) - the premier regional platform for debate and analysis of politico-socio-economic issues and problems facing South Asia, was also held. The Summit brought together stakeholders to review and reflect on current issues facing South Asian countries. The overarching theme of SAES was *Regional Cooperation for Sustainable Development in South Asia*. The anthology published as a result of the SDC and SAES is titled *Securing Peace and Prosperity*.

## NINETEENTH SDC (2016)

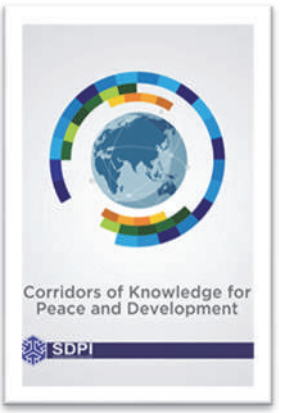

The overarching theme of the Nineteenth SDC was **Sustainable Development: Envisaging the Future Together**. It focused on cooperation between developed and developing countries for sustainable development, Sustainable Development Goals, and human centredness. The themes highlighted in this conference were recovering from conflict, SDGs, trade, economic growth, environment, sustainable energy, regional economic integration, minority rights, disaster management and preparedness, climate change, youth employment, gender and demography, gender and democracy, etc. The anthology published as a result of this SDC is titled *Sustainable Development: Envisaging the Future Together*.

## TWENTIETH SDC (2017)




The Twentieth SDC titled **Seventy Years of Development: The Way Forward** will be remembered within and by the development sector of Pakistan and the region for some time as one of the largest congregation of the best and brightest minds coming together in 40 panels, roundtables and podium discussions, many of which were concurrent, including four plenary sessions. It examined 70 years of development in Pakistan and the region with participation from around the world. A total of 269 panellists representing 16 countries became part of this mega event - Afghanistan, China, Ethiopia, Finland (via Skype), France, Germany, India, Italy, Nepal, Pakistan, Thailand (via Skype), The Philippines, Sri Lanka, Switzerland, United Kingdom, the United States of America. An audience of over 3,000 attended the three-day flagship event. The edited volume published as a result of this SDC is titled *Seventy Years of Development: The Way Forward*.

## TWENTY-FIRST SDC AND ELEVENTH SAES (2018)




The Twenty-first SDC and Eleventh SAES on **Corridors of Knowledge for Peace and Development** discussed not only economic corridors, but also corridors of connectivity and knowledge and how they could steer the region towards peace and development. During the 40 concurrent sessions, it was highlighted that while a few regional organisations and processes may have stalled, the road to development must go on. This growing trend should not be allowed to impact research and development efforts and learning from each other's best practices. In fact, new collaborative partnerships need to be established on knowledge sharing and building bridges, while simultaneously strengthening old ones. 261 delegates attended these two joint events from 20 countries including Afghanistan, Australia, Brazil (via Skype), Brussels, Canada, China, Germany, Kenya, Maldives, France, India, Nepal, Sri Lanka, Switzerland, Tajikistan, Thailand, Pakistan and the Philippines, United Kingdom and the United States of America. While 204 delegates came from within the country, the remaining 57 represented the rest of the countries listed. An audience of over 4,000 attended the four-day proceedings. The peer-reviewed edited volume produced following these events is titled *Corridors of Knowledge for Peace and Development*.

## TWENTY-SECOND SDC


The overarching theme of the Twenty-second SDC **Sustainable Development in a Digital Society** was inspired by the Fourth Industrial Revolution and an era of digitalisation which has changed how human beings interact in the era of rapid revolution in technologies. It brought together scholars, researchers, policymakers, game changers, and members of the civil society to deliberate on ideas how to benefit from the Fourth Industrial Revolution where Artificial Intelligence is playing a lead role in our lives.

The Inaugural Plenary was held on 2 December 2019 at the Aiwan-e-Sadr with President of Pakistan Dr Arif Alvi as the Chief Guest who inaugurated the conference. The conference was attended by 223 panellists from 17 countries. Apart from 192 panellists from Pakistan, 31 speakers came from Afghanistan, China, Finland, France, Germany, India, Iran, Italy, Maldives, Nepal,

the Philippines (via Skype), Sri Lanka, Thailand (via Skype), Turkey, United Kingdom and the United States of America. 150 male panellists, 69 female panellists, and 4 transgender panellists presented their ideas and views. The current anthology is a result of the deliberations and research presented and is titled *Sustainable Development in a Digital Society*.

***Note:***
Previous anthologies can be viewed and downloaded for free from the following link: <https://www.sdpi.org/sdc/publications.php?event_id=958>

# ACKNOWLEDGEMENTS


## *DONORS & PARTNERS*

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1 The World Bank
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3 Friedrich Ebert Stiftung (FES)
4 Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ)
5 United Nations Development Programme (UNDP)
6 Ministry of Water Resources, Government of Pakistan
7 The United Nations Children's Fund (UNICEF)
8 International Union Against Tuberculosis and Lung Disease
9 United States Institute of Peace (USIP)
10 Oxford Policy Management (OPM)
11 The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)
12 International Labour Organization (ILO)
13 Engro Energy Limited
14 Pakistan U.S Alumni Network
15 Commission on Science and Technology for Sustainable Development in the South (COMSATS)
16 Nestle Pakistan
17 Accountability Lab
18 Embassy of France
19 Higher Education Commission (HEC), Pakistan
20 Allama Iqbal Open University, Pakistan

## *SDC ANTHOLOGY REVIEW PANEL*

SDPI prides itself in producing valuable and credible research. The blind peer review process is, therefore, a crucial means of determining both quality and validity of the research work which is published each year in the SDC anthology. This anthology also contains peer-reviewed papers presented at the Twenty-second SDC.

While our Panel of Referees grows each year, we remain cognizant that reviewer selection is just as critical as the review itself and hence, we chose each one carefully based on their reputation and expertise. Given how important and yet often invisible

this activity is to the outside world, we truly appreciate the unbiased and timely feedback we received on the papers that were peer-reviewed this year. The Institute and anthology editors wish to thank the following academics and professionals for their fair, constructive, and informative critique of the submitted works:

**Mr Ahmad Salim** is a poet, writer, social scientist, teacher, journalist and drama writer. At present, he is working at the Sustainable Development Policy Institute in Islamabad, Pakistan as Senior Research Advisor, as well as heading the South Asian Research and Resource Centre (SARRC) to facilitate doctoral students and scholars on South Asia's socio–politico-cultural themes.

**Ms Estefanía Charvet** is Head of Programmes at Southern Voice. Before joining Southern Voice, Ms Estefanía worked for research organisations in South America and Europe. She holds a Masters in Development Studies and Bachelors in Economics.

**Mr Fawad Sarwar** is a seasoned Senior Project and Operations Manager in Telecoms/IT industry, with more than 15 years of professional experience across wireless and mobile communications, and cyber security platforms. He is also a corporate trainer and has worked in senior project and operational roles with multinational organisations and vendors like Ericsson, Huawei & miscellaneous telco service providers in various countries/continents like Australia, China, the Philippines, Middle East and Africa.

**Dr Hina Aslam** is an Associate Research Fellow leading the energy portfolio as well as heading the China Study Centre at the Sustainable Development Policy Institute in Pakistan. She is an ecologist and energy specialist, and has published papers in high impact factor journals and has presented in many international conferences.

**Dr Jean-Luc Racine** is Emeritus Senior CNRS Fellow at the Centre for South Asian Studies, School for Advanced Studies in Social Sciences (EHESS), Paris, France. He works on the internal dynamics and geopolitics of India and Pakistan, including their relationships with China and Afghanistan.

**Dr Maria Saifuddin Effendi** is Assistant Professor, Peace and Conflict Studies at the National Defence University in Pakistan. She specialises in conflict resolution and peacebuilding and has published extensively in national and international journals.

**Dr Muhammad Asif Kamran** is former Agriculture Policy Chair at the Centre for Advanced Studies in Agriculture and Food Security, and is currently working at the Nuclear Institute for Agriculture and Biology, Faisalabad, Pakistan.

**Dr Shafqat Munir** is a Research Fellow and Director of the *Resilient Development Programme* at the Sustainable Development Policy Institute, Pakistan. He specialises

in policy research on humanitarian issues in line with achieving the Sustainable Development Goals (SDGs).

**Mr Syed Javed Nazir**, a veteran of more than 35 years in Journalism and Media Education, is currently teaching at the Lahore University of Management Sciences (LUMS) in Pakistan. He has previously been affiliated with the Wolfson College and the Centre for Research in the Arts, Social Sciences and Humanities, University of Cambridge; the Wee Kim Wee School of Information and Communication, Nanyang Technological University, Singapore; and the University of Michigan, Ann Arbor as a Distinguished Visiting Howard R. Marsh Professor of Journalism. His work has been published in a number of mainstream and academic publications from *The New York Times* to *Detroit News* to publications in Southeast Asia. He is the co-author of *The South Asian Islam* (Washington State University and Pyonter Institute); and author of *Balancing Civil Rights and National Security: Impact of Anti-terror Laws on Media and Civil Liberties* (2012).

**Dr Sylvie Matelly** is the Deputy Director of IRIS - French Institute for International and Strategic Affairs, Paris, France. After a Masters' degree in International Economics (with a minor in Financial Markets, Energy and Raw Materials), she pursued PhD in *Economic Determinants of Military Spending* and specialised in Defence Economics.

**Dr Vaqar Ahmed** is Joint Executive Director of the Sustainable Development Policy Institute in Islamabad, Pakistan. He has published and supervised research on topics related to macroeconomic policy, public finance, and international trade.

## *SDPI FAMILY*

Each SDC is the culmination of months of painstaking efforts and extensive institutional coordination. The success of the Twenty-second SDC lies in the guidance and 'fire-fighting' skills of SDPI's Executive Director, Dr Abid Qaiyum Suleri, and Joint Executive Director, Dr Vaqar Ahmed; cooperation of numerous panel organisers and the entire SDPI family.

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## *ANTHOLOGY EDITORS*

This publication would not have been possible without the constant support of:

**Ms Uzma T. Haroon**, Director of the Sustainable Development Conference (SDC) Unit; and Editor *Journal of Development Policy, Research & Practice* at the Sustainable Development Policy Institute in Islamabad, Pakistan. She has 30 years of experience in media and communication and has been the *tour de force* behind SDPI's annual international conference series since 2003. She is also co-editor of the past 17 SDC anthologies, including this one. Previously, she has worked with the UNDP's project on 'Portrayal of Women in Media', and *The Nation* newspaper for over ten years where she was editor of a weekly magazine and was also their senior reporter covering the social sector. She has Masters in Communication from the University of Hawaii, USA; and Masters in Journalism from the University of Punjab, Pakistan.

**Ms Imrana Niazi** is Senior Coordinator of the Sustainable Development Conference (SDC) Unit at the Sustainable Development Policy Institute in Islamabad, Pakistan. She is also Associate Editor *Journal of Development Policy, Research & Practice*. She has been working with SDPI since 2008. She has previously been associated as a lecturer with Bahria University, Islamabad and Fatima Jinnah Women University (FJWU), Rawalpindi, Pakistan. Ms Niazi has co-edited ten SDC anthologies, including this one. She is a gold medalist in Masters in Communication Sciences from FJWU.

**Ms Sarah Siddiq Aneel** is Senior Editor at the Centre for Aerospace & Security Studies, Islamabad, Pakistan. She has two decades of research, publishing and journal management experience in the development sector of Pakistan. She has more than 40 edited books and journal issues to her credit; and is on the Advisory Board of several academic journals. Ms Aneel's portfolio also includes strategic management of multi-stakeholder projects such as the Pakistan Environment Program (PEP) – a Canadian-funded national-level environmental initiative of the Government of Pakistan, International Union for Conservation of Nature and the Sustainable Development Policy Institute. A Chevening Fellow and LUMS-McGill Fellow, she has studied *Integrated Approaches to Sustainable Development Practices* from the Earth Institute, Columbia University, USA.

## *ANTHOLOGY COVER DESIGNER*

The title cover of this anthology has been adapted from the SDC 2019 poster. Following a poster competition, Ms Mehak Jamal of Fatima Jinnah Women University, Rawalpindi, was shortlisted. The design was further adapted and finalised by graphic designer, Ms Tehreem Saad.

# AUTHORS' BIO-NOTES

**Mr Ali Rehmat** is working as a Project Assistant with the *Resilient Development Programme* at the Sustainable Development Policy Institute, Islamabad, Pakistan.

**Mr Asad Khan Afridi** is a Researcher at the Independent Power Producers Association (IPPA), Islamabad, Pakistan.

**Ms Chandima Arambepola** is Senior Research Professional at the Centre for Poverty Analysis (CEPA), Sri Lanka. Her main area of research interest is internal and external labour migration.

**Dr Fatima Khushnud** is the Chief Executive Officer at the Independent Power Producers Association (IPPA), Islamabad, Pakistan.

**Ms Karin Fernando** is Senior Research Professional at the Centre for Poverty Analysis (CEPA), Sri Lanka and her research interests are Sustainable Development, Environmental and Natural Resource Management and Poverty Impact Monitoring.

**Brigadier Mohammad Yasin (Retired)** is Senior Advisor (Capacity Building), Sustainable Development Policy Institute (SDPI) in Islamabad, Pakistan. He has been with SDPI for over 26 years. He previously worked in the Prime Minister's Committee for Research and Analysis where he coordinated a number of research projects on district administration, police systems, dispensation of justice, Information Technology, and education. He also served at the National Institute of Electronics. He has a number of publications to his credit.

**Mr Navam Niles** is Research Associate with the Centre for Poverty Analysis (CEPA), Sri Lanka. His recent work focuses on the impact of the 4IR on sustainable development. This includes the provision of public goods to manage the disruptions caused by creative destruction, especially for low-skilled labour engaged in routine work.

**Dr Sylvie Matelly** is the Deputy Director of IRIS - French Institute for International and Strategic Affairs, Paris, France. After a Master's degree in International Economics (with a minor in Financial Markets, Energy and Raw Materials), she pursued a PhD in 'Economic Determinants of Military Spending' and specialised in Defense Economics.

**Mr Usama Nizamani** is a Junior Consultant at the Islamabad Policy Research Institute in Pakistan. His areas of interest include nuclear strategy, technology and policy issues related to internet governance, Artificial Intelligence and space weaponisation.

**Dr Usman Mustafa** is a Senior Consultant, Pakhtunkhwa Economic Policy Research Institute (PEPRI), AWK University, Mardan, Khyber Pakhtunkhwa, Pakistan.

**Ms Zaheema Iqbal** is a senior cyber security policy researcher at the National Institute of Maritime Affairs (NIMA), Bahria University, Islamabad, Pakistan. Her areas of interest include cyber governance, cyber policies, and emerging technologies.

**Mr Zubair Torwali** is a community activist, researcher, author, and educator based in Bahrain, Swat, Pakistan. He has published works in English, Urdu, and the Dardic Torwali language. His book in English, *Muffled Voices*, provides insight into Pakistan's social, cultural, and political issues. He is the founder of Idara Baraye Taleem-o-Taraqi (IBT), an organisation that focuses on education and development.

# PREFACE

*Dr Abid Qaiyum Suleri*

Executive Director
Sustainable Development Policy Institute

When the annual congregation of the Sustainable Development Policy Institute in the form of the Sustainable Development Conference (SDC) met in Islamabad from 2-5 December 2019 to deliberate on ***Sustainable Development in a Digital Society***, no one had imagined how fast the entire world would be propelled into this era by early 2020. Countries that were taking mini steps suddenly found themselves taking gigantic ones. The year 2020 set in an era of digital leaps where no one could be left behind. The Fourth Industrial Revolution (4IR) and Artificial Intelligence (AI) could be viewed through a clearer lens.

Until December 2019 and early January 2020, COVID-19 commonly known as Coronavirus, was directly impacting China, specifically the province of Hubei. The World Health Organisation (WHO) watched it closely declaring it a global health emergency which soon converted into a pandemic by early March 2020.

As the world shut down to contain the virus, digital society took on a new meaning at the global, regional, national and domestic level. What was discussed at SDPI's annual Conference also put in perspective how important it is for countries, especially the developing world, to adapt to the 4IR in this pandemic era.

The SDC, that started with a prime focus on South Asia, has over the last 22 years crossed regional boundaries and has now turned into a mega congregation of people from across the world working on and thinking about sustainable development.

The twenty-second SDC was made possible with support from 20 donors, partners, and panellists from near and far. From 2-5 December, a total of 35 sessions were organised of which six were plenary sessions and 29 concurrent sessions. It was attended by 223 panellists from 17 countries. Apart from 192 from Pakistan, 31 speakers came from Afghanistan, China, Finland, France, Germany, India, Iran, Italy, Maldives, Nepal, the Philippines (via Skype), Sri Lanka, Thailand (via Skype), Turkey, the United Kingdom (UK) and the United States (US). A total of 150 were male panellists, 69 female panellists and 4 transgender panellists. Over a span of four days, the Conference was attended by an audience of over 3,500. They expressed their opinions and shared their experiences on challenges, opportunities and level of preparedness of societies on the overarching theme of the SDC, i.e. ***Sustainable Development in a Digital Society.***

In the different panels and plenaries, panellists discussed the 4IR, AI and what it means for financial inclusion, taxation, trade, future of jobs, women entrepreneurs, social protection, renewable energy, climate change, air pollution, managing water resources, education, health, youth and peace building, cyber security, food security, regional stability, media, governance and accountability, transgender community, endangered languages, the Sustainable Development Goals (SDGs), the China-Pakistan Economic Corridor (CPEC), and use of social media for highlighting human rights violations.

**The 4IR, just like the earlier three revolutions, is expected to disrupt societies, economies, ecologies and even politics at a large scale. It will generate many socio-cultural and ethical, even religious, dilemmas; it will render many current jobs, professions and vocations as unnecessary and most, if not all, contemporary levers of financial regulation and control meaningless; it will interact with our environment and climate in a way that is very different from how earlier revolutions have.**

Though it is difficult to say if this will be for better or for worse, and it will make politics more personal and more interactive than it already is - leading to unforeseeable outcomes which can both be an anathema and an advantage to democracy.

A country like Pakistan where culture, economy, ecology and politics are all yet to be settled even by the standards of the previous industrial revolutions, this large-scale disruption can be a bane as well as a boon. The danger is that, given our current state of lack of preparedness for the 4IR, it may be more a bane than a boon.

**The introduction of technologies such as AI is highly likely to eat up many existing jobs, professions and vocations which, for a country like Pakistan, is bad news because we are already suffering from a high population growth rate and a very high ratio of young people entering the job market every year. The inability to employ them all is at the core of our social, political and economic instability. This may easily get worse with the 4IR.**

Similarly, block-chain technologies may lead to the introduction of digital currencies and digital financial transactions at a scale unknown to us so far. Pakistan, so it seems, is not ready for these changes both in terms of having the right kind of technological knowhow to benefit from them and the regulatory regimes to ward off their negative impacts.

Cloud-native computing and the Internet of Things will also raise questions about personal privacy, data control, surveillance and censorship that will need to be addressed immediately. Even with server-based computing and the existing Internet, we have seen that large corporations such as Google and Facebook and powerful states

such as the US exercise far more control over personal data, and are far more capable of conducting surveillance for commercial and political reasons than individuals and smaller states like Pakistan do.

The 4IR could also lead to further fragmentation and individualisation of human communities, thus, making collective action difficult on such things as environment and climate change. In a country like Pakistan, where the tradition for collective action for collective good is already weak, advent of the 4IR, with its dazzling new tools and toys, may push such serious issues to the back-burner.

On the positive side, new technologies will create new jobs. We, for instance, will need many more software engineers, scientists and data operators than we now have. We only need to ensure that we have invested enough time, effort and money in producing these kinds of highly skilled human resources. Looking at the state of human resources in today's Pakistan, unfortunately, the situation does not look very helpful.

AI will be much more productive and precise and much easier to maintain than human workers in jobs that require repetitive action and almost no thinking. This can allow factories, production plants and offices to run 24/7 without having to worry about overtime, holidays and vacations. Robotics can produce even more economic value by replacing human beings in many manual jobs where the risk of injury and death add to their costs.

4IR can also help us deploy AI and robotics in our hospitals and operation theatres to carry out tasks for which we do not have enough doctors and nurses; we can deploy the same technologies in sensitive and dangerous industries such as mining, power production, strategic installations and arms and armament production facilities; and we can use them in retail trade and commerce to create economies of scale and improve efficiencies. Block-chain technologies can also increase online trading and make online financial transactions both easy and secure. And, most importantly, many of the existing production technologies that are creating a lot of waste, eating up a huge amount of natural and environmental resources and throwing up noxious liquids and poisonous gases in our environment can be replaced with more efficient digital technologies that produce much less waste, use less raw materials to produce more products and treat their effluents and emissions in a better way. Again, the question is how well can we benefit from these changes, given the fact that we have not been able to fully exploit the potential of even the previous industrial revolutions.

**On this crossroad of technology, Pakistan needs to change its policies swiftly and comprehensively if it wants to avoid the negative fallouts of the 4IR and seize its positive outcomes. We need to take quick decisions and make massive changes and investments in educating our youth to produce computer engineers, scientists and data operators who can fit into the new digital economy being created.**

We immediately need to retrain the huge number of unemployed and unemployable youth we have in the country so that they are not left out by these massive changes. In this regard, the President of Pakistan's 'Initiative on Artificial Intelligence and Computing' is a step in the right direction. Its focus on training the youth in next generation technologies will certainly boost Pakistan's chances of benefiting from the 4IR. However, its scale remains small and limited to a few big cities and towns in the country.

Government policies need to go much further than that. They must aim to end the existing digital divide between the rich and the poor, on the one hand, and between different regions in the country on the other so that the benefits of new technologies are distributed across the country both equitably and simultaneously. As a starting point, the President's initiative should start from smaller, far off towns and cities rather than in big cities such as Karachi, Islamabad, Lahore, Peshawar, Quetta, etc., which are already better placed than the rest of the country in terms of WiFi connectivity, education and training. This equity in education and training, in turn, will help the government meet SDGs and the 'commitment to leaving no one behind' regarding education and technology over the decade of action.

Similarly, developing countries like Pakistan can leapfrog from their existing industrial and commercial techniques to those being offered by the 4IR. They can do this by doing away entirely with all their economic, financial and administrative policies that are relics of the colonial era and, in any case, are responsible for creating the imbalances and conflicts that exist in our economy, politics and society.

**A clean, green, peaceful and prosperous Pakistan is possible by using the 4IR's technologies for inclusive and equitable economic and human development, and for instituting production and commercial patterns that benefit both human beings and the environment they live in.**

Considering that the digital era has landed upon us faster than expected, the following three points need to be given importance:

1. Digital platforms are general purpose technologies which can be used in any sector so need to be promoted as the top priority. However, we need to work on bridging the digital divide.

2. Pakistan needs to fast track decision-making and productivity by use of digital technology, but the trade-off is redundancy of general skills, particularly in government. This is where unlearning and fresh learning is required to retrain civil servants.
3. Finally, there is capability deficit in state policymaking institutions. Hence, there is a need for Public-Private Partnerships for coming up with policy frameworks and implementation. The Planning Commission of Pakistan can, therefore, house a dedicated taskforce for proposing such a policy framework.

**Dr Abid Qaiyum Suleri**

# POLICY RECOMMENDATIONS[1]

**Policy debates, conducted in different silos, do not add value to the policymaking process. To address socioeconomic issues, such debates need to be better organised using one platform for larger and more sustained impact.**

The Sustainable Development Conference (SDC) is an invaluable resource for academics beyond just the research presentations and papers themselves or gaining advice, learning new techniques and imbibing novel ideas, it is also a forum where one can have one-on-one interactions with policy leaders in the Sustainable Development field – making one's ideas heard by those in policy corridors for practical application.

In fact, the policy recommendations from SDPI's Twenty-second SDC on ***Sustainable Development in a Digital Society*** were not only shared at the Concluding Plenary, the Institute also ensured that they reached the right legislator and government ministry/department for implementation and action. Some of the specific policy recommendations for a digital-ready Pakistan and for South Asia catch up with the global digital revolution are shared below in the following areas:

- Cyber Security & Technology
- Emerging Technologies & National Security
- Digital Financial Inclusion & Trade
- Tax Harmonisation
- International Cooperation, Regional Connectivity & SDGs
- Use of Evidence in Policymaking, Media & Fake News
- Governance, Accountability & Digitalisation of State Institutions & Officials
- Education
- Digital-ready Workforce & Youth
- Professional Training & Capacity Building
- Agriculture, Transport & Mining Sector
- Mental Health
- Personal Data Protection
- Human Rights & Digital Activism
- Cyber Bullying, Gender Equality & Women Empowerment
- Ecofeminism, Literature and Endangered Languages
- Transgender Community, Law Enforcement & Justice
- Water Security & Climate Change
- Air Pollution & Environmental Hazards
- Tobacco Control Regime

[1] Compiled, edited and revised from conference rapporteurs' reports by Ms Sarah Siddiq Aneel and Mr Saleem Khilji. Thematic compilation undertaken by Ms Sarah Siddiq Aneel, Ms Anam Masood, and Ms Fatima Khalid.

# CYBER SECURITY & TECHNOLOGY

- The government must put on ground Pakistan Computer Emergency Response Team/s (PAK CERTs) at the federal and provincial levels to ensure that there is a responsive CERT network in the country.
- Pakistan needs to establish a Unified Tri-service Cyber Command to plan and conduct synchronised activities and operations.
- The Ministry of Information Technology and Telecommunication should ensure the safety, maintenance and efficacy of technology in order to control the misuse of digital tools as well as to safeguard private information.
- Advances in Information and Communication Technology (ICT), machine learning, biotechnology, and their convergence require hard regulation and soft policy initiatives such as guidelines, certification procedures and labelling schemes. It is important to ensure that regulatory solutions fit their purpose and are coordinated nationally, regionally and internationally.
- More awareness needs to be created among the general public on the responsible use of digital technology.
- Organisations or enterprises need to change their business models in order to integrate new technologies.
- Data synergy should be adopted by various stakeholders to ensure that everyone has the same information and there are no knowledge gaps between institutions, especially public sector ones.
- An appropriate judicial setup should be created to deal with cyber security violations and cybercrimes.

# EMERGING TECHNOLOGIES & NATIONAL SECURITY

- Strategic stability in South Asia is being affected by the growing asymmetry in conventional forces between Pakistan and India as well as expansion and technological modernisation of military forces. This asymmetry is pushing India toward limited war strategies and escalation dominance. The introduction of Tactical Nuclear Weapons (TNWs) by Pakistan is vital for reinforcing deterrence.
- A National Cyber Security Agency (NCSA) should be established that must identify gaps to improve Pakistan's overall cyber security posture and lay down sector-specific requirements for regulators who should enforce these in public and private organisations. The Agency should formulate a National Security Strategy (NSS) that should be aimed at defending economic assets and preparing against cyber threats. It should encourage cyber research and develop human capital in this area.
- A practical Pakistan-specific security framework such as Cyber Security Maturity Matrix (CSMM) should be implemented. A Cyber Security Certification Board (CSCB) may be established to conduct on-site security assessment of important organisations against the CSMM.
- The Personal Data Protection Bill, 2018 and Prevention of Electronic Crimes Act, 2016 should be reviewed and amended and made more responsive after getting input from stakeholders.
- Pakistan should focus on improving its case to become a member of the Wassenaar Arrangement. The Arrangement, which is a voluntary export control regime, aims to promote greater responsibility among its members in exports of weapons and dual-use goods and to prevent 'destabilising accumulations'.

# DIGITAL FINANCIAL INCLUSION & TRADE

- South Asia, in general and Pakistan, in particular need to bridge the digital divide by bringing in communities and people at the peripheries of development into the digital sphere through special allocations in order to ultimately move towards greater financial inclusion.
- A holistic coherent approach is needed for making a policy on Digital Financial Inclusion in Pakistan. The policy should be unidirectional and have quantifiable targets and indicators.
- Since 70% trade-related regulations in Pakistan are redundant, authorities need to bring about regulatory procedural reforms in order to further promote Ease-Of-Doing-Business. In this regard, an intergovernmental group should be formed for intermediation.
- Administering regulations is key for success and the Government of Pakistan (GoP) should concentrate on creating a conducive environment where business processes are streamlined and implemented by specialists.
- Regulatory agencies must have qualified and capable people who interpret regulations appropriately. For this purpose, best practices should be adopted to choose the right person for the right job.

- It is vital for Pakistan to learn from Vietnam and Singapore in order to increase productivity and add value to its exports sector.
- Pakistan should enhance technological partnerships with China in order to benefit from Chinese expertise in the digital field.
- The GoP should encourage entrepreneurship since the number of job opportunities being created under the 4IR are more than the jobs being lost.
- The GoP should facilitate people with duty-free digital gadgets like smart phones.
- There should be incentives for entrepreneurs to develop new technologies by offering them tax reductions and subsidies.
- Banking institutions should be encouraged to move towards green finance models.
- A credit score card should be introduced to enhance digital financial activity as well as incentivise customers. In addition, lending should be based upon the credit scores of every customer.
- Incentives should be given to citizens who are voluntarily using or trying to use digital wallets or electronic banking.
- South Asian states need to invest in markets that generate demand for digital-ready workers, and public goods that can create a supply of workers, especially in the long-term.
- Pakistan needs to work on structural reforms that create incentives for workers to develop skills that generate the highest rewards: from improving competition at home (before exposure to competition from abroad) to encouraging urbanisation. Broad partnerships, in this case, are necessary between governments, industries, and universities.
- The government should reassess which sectors of the economy should be protected and which should be de-regulated. A mix, of regulatory and de-regulation policies is, needed for digital transformation.
- A roadmap for the revival of growth in Pakistan is imperative for restoring confidence of local and foreign investors.
- Development partners should play an active role in ensuring that the poorest of the poor are insulated from the pain of fiscal adjustment.
- Integration with Global Value Chains is crucial for productivity, growth and long-term sustainability. To achieve the latter, the GoP needs to reduce trade costs and improve the investment climate.
- Zero interest loans should be given so that people are encouraged to use and maintain bank accounts.
- Banks should reduce the percentage of tax on electronic transactions.

# TAX HARMONISATION*

- There is a need to have a single National Revenue Service in Pakistan.
- The Federal Bureau of Revenue (FBR) and tax departments should have centralised data.
- Revenue boards should have one log-in and one system of taxation.
- Tax collection institutions should be independent.
- There is a need to reduce interaction between taxpayer and tax collectors and create an automated system for tax rebate. For this purpose, digital technology should be used to circumvent corruption.
- There is a need to integrate taxation authorities for one-window solution – enabling not only the inter-adjustment of refunds, but also facilitating a single tax return form for both federal and provincial taxes.
- Provincial tax laws should provide details of taxable services in a manner consistent across provinces to reduce unnecessary future litigation.
- Standardisation of sales tax across most services in provinces should be undertaken.
- Improved accounting for taxes paid under the reverse charge mechanism need to be done.
- The time period for claiming input tax credit should be consistent across all provincial revenue administrations.
- A single base to calculate all taxes applicable on acquisition and disposal of property in provincial or federal jurisdiction should be created.
- Tax collection needs to be automated and digitalised. Analytic tools should also be used by the federal and provincial revenue and tax administrations.
- Tax authorities need to take participatory decisions.
- Localised revenue collection methods need to be developed by local bodies and supported by the federal government.
- Provincial governments need to be more proactive in supporting the federal government for the successful implementation of the International Monetary Fund (IMF) programme, particularly with respect to revenue mobilisation.
- Burden of austerity should not be distributed to the poor masses.

* These recommendations, although Pakistan-centic, can and may be replicated in other developing economies as well.

# INTERNATIONAL COOPERATION, REGIONAL CONNECTIVITY & SDGs

- More comprehensive high-level international cooperation is needed in order to reap the benefits of the 4IR.
- The China-Pakistan Economic Corridor (CPEC) should be transformed into a regional connectivity project, which may act not only as an energy corridor but also an ecological one. Expansion of CPEC can create a new South Asia san wars.
- India should be encouraged to join CPEC since mutual cooperation for progress will also lead to peace and resolving conflicts like Jammu and Kashmir.
- Pakistan should establish an interconnected energy network with China.
- State and non-state actors need to cooperate internationally in order to harness the opportunities and adapt to challenges posed by the rapid digitalisation of Pakistan's economy.
- Pakistan should be an active partner in efforts being made by the United Nations like setting up the Group of Government Experts (GGE). Cyber security may also be discussed at the Shanghai Co-operation Organization (SCO) between member states.
- For South Asia to do well on the Sustainable Development Goals (SDGs), South Asian Association for Regional Cooperation (SAARC) countries need to build trust and understanding with each other. Cooperation in areas such as education, water and energy is vital for the region's development.
- China and Iran should be made SAARC members.
- SAARC countries should learn from each other's best practices as well as each other's failures.
- For achieving the SDGs, importance of integration and collaboration between regional and national institutions is vital for the better execution of programmes. In this regard, regular joint policy interactions at various official levels are required.
- It is vital to devolve financial powers to local bodies and Community Resource Persons for the effective implementation of SDGs in Pakistan.
- At the rural level, women empowerment is essential through the use of e-commerce platforms. India, Pakistan and Bangladesh can learn from each other in this case.
- Knowledge, information and communication gaps must be bridged for achieving inclusive growth and sustainable development.

# USE OF EVIDENCE IN POLICYMAKING, MEDIA & FAKE NEWS

- Government functionaries should observe and study promising best practices around the globe for nationally-led and nationally-owned public policy processes.
- Evidence-based research has gained global limelight. Experimental research is providing increasingly better and effective data for making better policy decisions.
- Government departments need to enhance their existing capabilities and focus on learning digital tools to ensure the use of evidence in policymaking.
- Institutional building is crucial. Institutions that are built efficiently are able to take up and produce better policies based on evidence.
- Fake news and sophisticated disinformation campaigns are especially problematic in democratic systems. In order to maintain an open, democratic system, the Government of Pakistan (GoP) should promote news literacy and strong professional journalism. The media industry must provide high-quality journalism in order to build public trust and correct fake news and disinformation without legitimising it.
- The GoP should invest in an institution that identifies fake news, reduces financial incentives for those who profit from disinformation, and improve online accountability.
- Triple-helix approach needs to be implemented in which private-public sectors must be linked with the media.

# GOVERNANCE, ACCOUNTABILITY AND DIGITALISATION OF STATE INSTITUTIONS & OFFICIALS

- A mechanism needs to be devised for smarter and more efficient use of technology in order to enhance transparency and accountability of state institutions. In this regard, the Government of Pakistan (GoP) should train civil servants on using digital tools and technologies to fast-track public service provision.
- The GoP should devise proper rules and laws to regulate the use of digital technology by public officials and departments. It should review the existing National e-Governance and ICT policies to identify gaps in progress and make policies more realistic rather than creating wish lists.
- It is vital to implement existing laws to ensure citizens participation in public decision-making. The GoP must utilise available ICT tools and social media platforms to ensure participation.
- Policies need to have consistency and must not be revoked or changed frequently. In this regard, federal and provincial level coordination is essential.
- The Ministry of Planning, Development and Reform should create a dedicated taskforce where public and private sectors are represented for proposing frameworks to overcome the existing capacity deficit in state policymaking institutions. Bureaucracy and civil servants should be trained to use digital technology in order to fast-track decision-making and increase productivity keeping in mind the trade-off between unlearning and fresh learning. In this regard, more Public-Private Partnerships (PPPs) need to be encouraged in order to come up with an implementation policy framework.

- Think tanks should play a major role in providing provincial governments with policy recommendations regarding Digital Social Security.
- One-window services should be used to enhance communication between service providers and beneficiaries. Under a single window service, all the relevant data can be verified through a single window. With exclusion of many intermediates, physical attendance, etc. the government can provide benefits to the poor cost-effectively.
- A detailed mapping exercise of government policies should be undertaken.
- In order to make government functions smoother and make state institutions and officials accountable, Pakistan needs to equip state functionaries with modern digital tools and build the capacity of the public officials to make governance more impactful.
- Consensus building is required on the notion of public accountability at the highest political level by determining the role of citizens in making the government accountable through citizen participation in policymaking.

# EDUCATION

There is a need to improve the quality of education in Pakistan by:

- Introducing virtual classrooms.
- Improving Internet and network availability in educational institutions across the country.
- Enriching the curriculum with more focus on Sciences and IT-related subjects. The government should establish stronger linkages between academia and industry, particularly focusing on subjects like Science and Mathematics.
- Providing multiple media content according to the needs of students and teachers.
- Building the capacity of teachers in operational, cultural and critical dimensions of new digital platforms.
- Developing a more nuanced and revised National Education Policy in line with the demands of the 4IR.
- Adopting cost-effective digital methods in teaching.
- Decentralising the education system.
- Assessing student enrolments, teaching methodology and content using digital software and tools.
- While the development of higher education is vital for Pakistan, there is need to prioritise primary and secondary education.
- In order to move towards a uniform education system in all provinces, greater coordination between various education departments is required.
- Quality assurance should first be implemented in the Higher Education Commission and from there, it should be implemented in universities.
- Pakistani universities must be transformed into digital spaces.
- Promoting critical thinking in the younger generation with the help of parents and teachers so that they might be responsible and mature about use of digital technology.
- Educationists should use innovative teaching methods in classrooms so that on-job training can benefit the students towards career progression and better jobs.
- Student exchange programmes help build camaraderie between communities across borders and should be encouraged and supported by regional governments and universities.

# DIGITAL-READY WORKFORCE & YOUTH

- Pakistan missed the Third Industrial Revolution. The 4IR should not be missed which is essentially skill-based. The future of work and digitalisation should be viewed in the context of change in demography, climate, and the traditional employer-employee relationship.
- Access to digital technologies should be ensured for the larger public in order to bridge the digital divide.
- There is a need to delve upon how digital systems are being structured to promote human-centric policies and design thinking.
- There is an urgent need for digital education and digital skills through educational curricula/programmes as well as career development tools to facilitate both capacity building and resilience.
- It is important to study the impact, challenges and needs of young people in a participatory manner to build new partnerships between young people and the state.
- Governments must ensure that the youth do not become redundant due to loss of jobs as a result of increased digitalisation. Hence, there is a need to secure jobs for young people and guarantee that inequalities are being planned for and managed.
- Young people should be allowed to express themselves and given platforms for their meaningful inclusion and participation in state decision-making.
- There is a need to analyse different parameters, which can help keep Pakistani youth away from extremism.

- The government's business and entrepreneurship policies should look at ways to enhance access to knowledge through digital media even in the marginalised regions of Pakistan.
- Local businesses lack international connections and companies like Amazon & Paypal can help local business tap global markets. There is a need to provide commercial incentives to these companies so that they might invest and set up their offices in Pakistan.
- There is a need to initiate entrepreneurial spirit among the youth to promote ideas for digitalisation.
- The GoP should focus on the digital skills development of women to improve their employment and financial prospects.
- Developed economies, such as the United States, have highly competitive markets that have excess demand for a digital-ready workforce. These economies need to invest more in human capital.
- Creating a digital-ready workforce requires incremental reforms that carefully expose industries to international opportunities and competition through Global Value Chains.
- Relevant government ministries and universities should invest in Research & Development to assess the demand for skills and help inform inclusive and indigenous trainings to meet the requisite requirements.

# PROFESSIONAL TRAINING & CAPACITY BUILDING

- It is the need of the hour to develop greater linkages between skills providers, academia and industries to help bridge the gap between the kind of skills required and the training which public and private sector institutes are able to provide.
- It is important that the present efficiency-based skill model be transformed into a knowledge-based skill model.
- Continuous training of the workforce is required in order to keep pace with rapid digitalisation and technological changes.
- Skill development may be delegated to the private and development sectors in order to respond to the structural gap between the type of labour demanded and supplied.
- Public, private and development sector stakeholders need to work together to enhance the educational and technical skills of youth so that they can achieve their dreams.
- More educational and training support needs to be provided to aspiring women entrepreneurs, especially in rural areas, on how to set up small and medium-sized businesses and other aspects related to marketing and outreach etc.
- Online courses on entrepreneurship need to be introduced, along with Cyber Security professional degrees in universities with the help of Higher Education Commission (HEC).
- Vocational and technical training need to be integrated within the curricula of secondary schools by adding subjects that equip students with more employable skills from an early age, before they enter the workforce.
- Transferable Skills Trainings (TST) and digital inclusion of young people is very important to ensure sustainable development in Pakistan.
- Skills development should be part and parcel of all major economic and industrial policies so that it feeds into the broader growth agenda.

# AGRICULTURE, TRANSPORT & MINING SECTOR

- Pakistan's agriculture sector must be strengthened through technological modernisation and can help in achieving the SDGs directly and indirectly.
- The government should provide an enabling environment to promote the use of digital technology to increase food productivity.
- A digital Punjab programme should be launched to export agri-products to increase profitability of the agriculture sector.
- Cost-effective and indigenous precision agriculture technologies should be introduced at the farm level.
- Farmer associations need to be better organised into viable units to build their capacity and create awareness and acceptance of modern technological tools.
- A road map for Smart Farm Development should be devised that includes a formal research agenda, pilot testing and information advocacy.
- Drip and sprinkler irrigation should be adopted to make efficient use of water.
- Import of food items should be reduced to support local growers and manufacturers.
- The government should decrease indirect taxes and the rising prices of food items need to be curtailed since this directly impacts the common citizen.
- Interdisciplinary teaching, research, and collaboration amongst all stakeholders is a must to improve Pakistan's food security.
- Transport sector needs to be regulated to control the increasing number of cars. Public transportation facilities need to be improved and developed in this regard.
- Amendments should be made in the Mining Laws and Regulations of Pakistan to ensure community participation in mining contracts to avoid conflict between the locals, the company and the government. Free, Prior and Informed Consent (FPIC) of the communities should be ensured. The government should develop a formal criterion for land royalty and profit sharing between communities and company to avoid conflicts. Making changes in the national policy can bring huge changes in the lives of indigenous communities. This will help them prosper financially, eradicate poverty, hunger, illiteracy, frustration, mass migration and violence.
- The GoP should develop a system and mechanism of social protection for workers employed by enterprises like Uber and Careem in order to ensure their working rights under decent work and decent wage.
- Digital profiling of recipients of Social Protection Programmes should be undertaken to target the deserving population.

# MENTAL HEALTH

- The focus of mental health initiatives should be on socially-significant outcomes and developing strategic partnerships. To counter mental health crisis in Pakistan, collaboration needs to be multipronged and multisectoral and go beyond merely health and education.
- Awareness campaigns should be run in educational institutions, especially schools, where the contextual linkages between digital technology and mental health impacts are debated. Offices should also encourage frequent breaks for employees from daily screen time.
- The government, especially the Ministry of Health, should set up subsidised mental health facilities and create more awareness at the meso and macro level about the negative impact of technological gadgets in Pakistan, where 20% people suffer from mental illnesses.
- Use of meditation apps should be promoted which can easily be accessed for dealing with depression due to the isolationist nature of social media.
- It is important to improvise innovative strategies to focus on mental health issues which are grounded and relevant to the context of Pakistan.
- Mental health should be made part of the primary healthcare sector, like basic health units.
- Think tanks and universities should conduct research to identify gaps in mental health concerns to address the problem at policy level (No Data = No Policy).

# PERSONAL DATA PROTECTION

Pakistan's Personal Data Protection Bill, 2018 is comprehensive, but needs to be improved significantly to effectively protect privacy and meet international standards for protecting personal data. In this regard, the following needs to be done:

- Include public bodies and government-held personal data within the ambit of the Bill by not restricting it to commercial transactions.
- Expand the definition of personal data to include all personal data held by both private and public bodies without the caveat of commercial transactions attached to it.
- Define the scope of the Bill clearly to ensure that the rights of data subjects are protected regardless of where their data is processed or held.
- Given that consent of the data subject is a major principle guiding data collection, it is important that consent be defined. This definition should ensure that consent is explicit, free, informed, proactive and specific.
- The definition of 'sensitive personal data' needs to be expanded to include biometric and genetic personal data.
- Data processing by Law Enforcement Agencies (LEAs) and investigation and intelligence bodies needs to be addressed under the Bill. These authorities should be subject to the standards of necessity and proportionality enshrined in International Human Rights Law.
- International data sharing needs to be addressed and higher standards should be in place to govern such transfer.
- Exemptions should be limited, including the broad powers awarded to the federal government.
- Ensure that any deviations from the law are subject to an open, inclusive and transparent legislative process.

# HUMAN RIGHTS & DIGITAL ACTIVISM

- South Asian countries are particularly volatile due to issues of human rights, civil liberties and freedom of speech. The advent of digital media has accentuated these issues to a substantial degree. Whether it is climate change or the struggle for self-determination by the people of Indian Occupied Jammu & Kashmir, countries in South Asia need to look at international human rights norms as well as international regulations on digital rights of citizens which should be democratic and not border on censorship.
- Well-thought out and deliberated legal mechanisms are required to understand the nuances of the interconnected nature of human rights movements and digitalisation.
- Digital activism or the use of digital technologies to facilitate change in the political and social realms is a rapidly evolving and strengthening area. Think tanks and universities should conduct research on how to use digital activism to focus on human rights issues in various countries across the world.

# CYBER BULLYING, GENDER EQUALITY & WOMEN EMPOWERMENT

- Violence, through games leading to cyber bullying and suicide rates, is increasing. In this regard, national monitoring by the Government of Pakistan (GoP) is needed so that digital crimes can be controlled.
- The GoP needs to enact stronger legislation for the protection of women against cyber bullying and punish the abusers. Online bullying and threats need to be reported instead of being ignored or deleted. By deleting such comments, the evidence is destroyed, so reporting should be the norm.
- Trainings should be imparted on the mechanisms of reporting abuse and campaigns should be initiated to raise awareness and enhance knowledge among women about the reporting of cyber bullying and online abuse.
- Governments should develop more women-friendly police in countries like Nepal, Iran and Pakistan so that women may feel safe while reporting their issues and are facilitated instead of facing further intimidation and violence.
- A coordinated effort is required through digital rights organisations for naming and shaming cyber bullies so that cyber bullying is not normalised.
- There is a need to set up strong women networks for the support and emotional well-being of victims of abuse as sisterhood and networking are important to fight against female workplace harassment.
- It is important to give greater visibility to women in the history that is taught to younger generations of boys and girls. The latter will, thus, be better able to envisage a shared vision for the future founded on mutual respect and sheltered from ancestral prejudices.
- More opportunities for interaction and networking in a safe and secure environment should be provided to courageous women belonging to militarised areas like Indian Occupied Jammu and Kashmir so that they can express themselves and gain exposure in order to avail international job prospects.
- Strong networks should be created to bring to public knowledge the harassment faced by women.

# ECOFEMINISM, LITERATURE & ENDANGERED LANGUAGES

- Although there has been some work on South Asian ecofeminism in fiction, and poetry, it is yet to have a strong impact. Writers should also focus on community-based economics, local and sustainable agricultural systems, and locally led ecological ventures, local governance and systems of decision-making, information-sharing, and human rights.
- Ecofeminism in modern Chinese literary research is limited and there is a need to further work in this area.
- South Asian governments should recognise the role women are playing and how ecofeminism can be applied to environmentally-sustainable consumption and conservation practices.
- Further research should be done on ecofeminism and it should also become a part of school curriculum.
- All the languages of South Asia should be presented on a cultural map.
- Digital tools and instruments can ensure survival of endangered languages.
- Language and religion should not be mixed.
- People of a common language across borders should remain in contact with their lingual partners through digital media.
- South Asian governments need to formulate laws for supporting linguistic integrity and conservation of endangered regional and indigenous languages.
- Progress and protection of Sindhi language in Pakistan should continue. The best practices adopted for its digital development should be considered by less recognised languages.
- Mother tongue-based education should be introduced at the primary level.

# TRANSGENDER COMMUNITY, LAW ENFORCEMENT & JUSTICE

- While Pakistan's Transgender Persons (Protection of Rights) Act, 2018 makes it the first Asian country to recognise self-perceived gender identity, far more steps are needed to effectively end discrimination, taboos and violence against transgender people. Acceptance and awareness by family and society, in this regard, is of utmost importance.
- The Government of Pakistan (GoP) needs to implement the Act in true letter and spirit by making special allocations for the education and skills training of transgender people.
- The Act allows transgenders to apply for driving license, passport, interest-free loans, etc., but more awareness about the Act needs to be created. For example, they should not be deprived of rightful inheritance by their families.
- Law-enforcement and other government officials should be trained about the Act so that they are able to enforce the penalties defined for violence, illegal expulsion and harassment of transgenders.
- The GoP should provide separate wards to transgenders in hospitals if they are not accepted and accommodated in regular wards.

# WATER SECURITY & CLIMATE CHANGE

- More investment should be made available for building small dams to improve Pakistan's water storage capacity.
- Smart water management systems need to be adopted in South Asia, especially Pakistan in order to make the water supply system more resilient and efficient by reducing costs and improving sustainability. High-technology solutions for the water sector include digital sensors and meters, Geographic Information Systems (GIS), and Supervisory Control and Data Acquisition (SCADA) systems.
- Pakistan's existing National Water Policy, 2018 needs to revised and updated to factor in the use of digital tools, frameworks and instruments. A stronger regulatory mechanism and more financial resources need to be in place to deal with Pakistan's growing water scarcity. The policy needs to be implemented in letter and spirit.
- Rain and flood water harvesting should be adopted as alternative water supply solutions, not only in arid and semi-arid regions, but also for reducing flood risk in urban and rural areas.
- It is important to create more awareness in the public regarding efficient water usage/conservation to reduce wastage and overuse. There is a need for partnership with the media in this regard.
- Individual efforts are required for the conservation of resources, especially energy and water. Eco-friendly sustainable societies are only possible through public cooperation.
- There should be more investment in clean and environment-friendly technologies.
- Unified water services should be provided in order to enforce laws and policies. In this regard, the Ministry of Water Resources needs to be strengthened.
- Since water is a provincial subject, engagement with communities should be ensured for water conservation as well as holding local officials accountable for water provision.
- Digital tools for water management, such as the telemetry system, should be used in Pakistan.

# AIR POLLUTION & ENVIRONMENTAL HAZARDS

- Pakistan's Ministry of Climate Change should subsidise clean energy projects like solar energy and wind farms.
- All provinces of Pakistan have set up their own environmental priorities, but there is a need for collective action to address the issue of air pollution.
- Scepticism, regarding environmental hazards and climate change, needs to be addressed by creating more awareness amongst the masses and media.
- Research should be done on the pricing of carbon emissions and taxes, as well as the huge land cover changes that will occur under the China-Pakistan Economic Corridor and impact air and water quality.
- Air pollution is a silent killer and should be taken seriously. While the air quality of major cities like Karachi, Lahore, Peshawar, Islamabad, and Faisalabad are in the spotlight due to data availability, however, other cities also require air quality monitoring.
- The impact of smog on health can be monitored with the number of hospital visitors being observed in every district and city.
- It is the need of the hour to sensitise and educate the masses about increasing risk of air pollution and smog. Farmers should be convinced to stop burning crop stubble or residue and household garbage burning.

# TOBACCO CONTROL REGIME

- The tobacco industry falls under Pakistan's Ministry of Commerce and Federal Board of Revenue which is causing burden on the health sector. Intergovernmental coordination is required in this regard.
- A comprehensive multi-sectoral tobacco control policy is needed in Pakistan. In this regard, regional as well as global best practices need to be replicated.
- The government should enact new laws related to vaping, vaping products and vape hubs in Pakistan.
- Schoolchildren should not be exposed to tobacco products, especially cigarettes.
- Size of the Graphic Health Warning (GHW) on cigarette packs needs to be revised without any delay to warn people of the links between smoking and cancer. A pathological image may be used as GHW instead of using a particular organ. A graphic image without details may be difficult to understand by less educated people.
- Debate on tobacco use is needed within academia and policymakers.
- There is an urgent need to stop growth of the tobacco crop and introducing alternative crops.

# INAUGURAL PLENARY AT AIWAN-E-SADR

Welcome Remarks

Inaugural Address

Keynote Address

Special Remarks

Welcome Remarks

# Sustainable Development in a Digital Society

*Dr Abid Qaiyum Suleri*

Executive Director,
Sustainable Development Policy Institute

Excellency Dr Arif Alvi, President of Islamic Republic of Pakistan,
Dr Sania Nishtar, Federal Minister, Poverty Alleviation and Social Protection,
Mr Haroon Sharif, Former Chairman Federal Board of Investment,
Ambassador Shafqat Kakakhel, Chairperson, SDPI's Board of Governors,
Dignitaries from the Diplomatic Missions,
Friends from Academia, Media and Development Sector,
Ladies and Gentlemen,
السلام علیکم!

It is a privilege to introduce the Twenty-second edition of SDPI's annual conference, which twenty-two years ago started as a South Asia-focused Sustainable Development Conference, but over the years has crossed regional boundaries. Today, it has turned into a mega congregation of people from across the world, working on and thinking about Sustainable Development.

This year too, we have delegates from 18 countries. In alphabetic order, these include Afghanistan, China, Finland, France, Germany, India, Iran, Italy, Kenya, Maldives, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand, Turkey, United Kingdom, the United States of America.

In 29 panels and six plenary sessions, over 244 speakers out of which one-third are women speakers (inshAllah, we aim to improve this ratio next year), would share their experiences on challenges, opportunities and level of preparedness of societies for sustainable development in a digital age.

We would be holding threadbare discussion in our panels on the Fourth Industrial Revolution, Artificial Intelligence and what it would mean for Financial Inclusion, Taxation, Business Reforms, Trade, Future of Jobs, Women Entrepreneurs, Social Protection, Renewable Energy, Climate Change, Air Pollution, Education, Health, Youth and Peace Building, Regional Stability, Cyber Security, Food Security, Media, Governance, Accountability, Transgender Community, Art and Culture, Sustainable Development Goals, China-Pakistan Economic Corridor, and use of Social Media for highlighting Human Rights Violations such as those in Indian Occupied Jammu & Kashmir.

Your Excellency, no one is more mindful than your good self that the Fourth Industrial Revolution (4IR), just like the earlier three revolutions, is expected to disrupt societies, economies, ecologies and even politics at a large scale.

**4IR will generate many socio-cultural and ethical, even religious, dilemmas. It will render many current jobs, professions and vocations as unnecessary and most, if not all, contemporary levers of financial regulation and control as meaningless. It will interact with our environment and climate in a way that is very different from how earlier revolutions have, though it is difficult to say if this will be for better or for worse. It will make politics both more personal and more interactive than it already is, leading to unforeseeable outcomes which can both be an anathema and an advantage for democracy.**

A country like Pakistan where culture, economy, ecology and politics are all yet to be settled even by standards of the previous industrial revolutions, this large-scale disruption can be a bane as well as a boon. Unless we prepare ourselves for the Fourth Industrial Revolution, it will be more a bane than a boon. The introduction of technologies such as Artificial Intelligence (AI) is highly likely to eat up many existing jobs, professions and vocation which, for a country like Pakistan, is bad news because we are already suffering from a high population growth rate and a very high ratio of young people entering job markets every year. The inability to employ them all is at the core of our social, political and economic instability. This may easily get worse with 4IR. Similarly, blockchain technologies may lead to the introduction of digital currencies and digital financial transactions at a scale unknown to us so far. Pakistan, so it seems, may find it difficult to face the changes both in terms of having the right kind of technological know-how to benefit from them and the regulatory regimes to ward off their negative impacts.

Cloud-native computing and the Internet of Things (IoT) will also raise questions about personal privacy, data control, surveillance and censorship that will need to be addressed immediately.

**Even with server-based computing and the existing Internet, we have seen that large corporations such as Google and Facebook and powerful states exercise far more control over personal data and are far more capable of conducting surveillance for commercial and political reasons than individuals and developing economies like Pakistan do.**

The Fourth Industrial Revolution could also lead to further fragmentation and individualisation of human communities, thus, making collective action difficult on such things as environment and climate change. In a country like Pakistan where the

tradition for collective action for collective good is already weak, the advent of 4IR, with its dazzling new tools and toys, may push such serious issues to the back-burner.

However, the Fourth Industrial Revolution is not only about negativity.

**On the positive side, new technologies will create new jobs.**

We, for instance, will need many more software engineers, scientists and data operators than we now have. We only need to ensure that we have invested enough time, effort and money in producing these kinds of highly skilled Human Resources.

Likewise, Artificial Intelligence will be much more productive and precise and much easier to maintain than human workers in jobs that require repetitive action and almost no thinking. This can allow factories, production plants and offices to run 24/7 without having to worry about overtime, holidays and vacations. Robotics can produce even more economic value - by replacing human beings in many manual jobs where the risk of injury and death add to their costs. Again, the question is how well can we benefit from these changes, given the fact that we have not been able to fully exploit the potential of even the previous industrial revolutions.

There are countless opportunities that we can take advantage of in order to derive the maximum benefit from 4IR. It can help us deploy AI and robotics in our hospitals and operation theatres to carry out tasks for which we do not have enough doctors and nurses. We can deploy the same technologies in sensitive and dangerous industries such as mining, power production, strategic installations and arms and armament production facilities, and we can use them in retail trade and commerce to create economies of scale and improve efficiencies.

Blockchain technologies can also increase online trading and make online financial transactions both easy and secure.

**Many existing production technologies that are creating a lot of waste, eating up a huge amount of natural and environmental resources and throwing up noxious liquids and poisonous gases in our environment, can be replaced with more efficient digital technologies that produce much less waste, use less raw materials to produce more products and treat their effluents and emissions in a better way.**

On this crossroads of technology, therefore, Pakistan needs to change its policies swiftly and comprehensively if it wants to avoid the negative fallouts of the Fourth Industrial Revolution and grab its positive outcome. We need to make massive changes and investments in educating our youth to produce computer engineers, scientists and data operators who can fit into a new economy.

More importantly, we immediately need to retrain the huge number of unemployed and unemployable youth we have in the country so that they are not left out by massive technological changes.

In this regard, I would like to thank His Excellency for his pioneering initiative on Artificial Intelligence and Computing. The focus of this initiative on training the youth in next generation technologies will certainly boost Pakistan's chances of benefiting from the Fourth Industrial Revolution. However, one would request that its scale may be broadened to small cities and far-off towns across Pakistan.

**Broadening of the President's initiative would help in ending the existing digital divide between the rich and the poor on the one hand, and between different regions of the country on the other, so that the benefits of the new technologies are distributed across the whole of Pakistan both equitably and simultaneously. This equity in education and training, in turn, will help the government meet its Sustainable Development Goals regarding education and technology over the next ten years.**

Countries like Pakistan can leapfrog from their existing industrial and commercial techniques to those being offered by the Fourth Industrial Revolution. They can do this by overhauling with all their economic, financial and administrative policies that are relics of the colonial era and, in any case, are responsible for creating the imbalances and conflicts that exist in our economy, politics and society.

A clean, green, peaceful and prosperous Pakistan is the vision of the current government. It can be made possible by using the Fourth Industrial Revolution's technologies for inclusive and equitable economic and human development and for instituting production and commercial patterns that benefit both human beings and the environment they live in.

Honourable President of Pakistan, before concluding, let me offer my profound gratitude, not only for sparing your valuable time, but also for hosting the inaugural ceremony of our Conference at *Aiwan-e-Sadr*. This reflects the importance your Excellency gives to the subjects of Sustainable Development and the Fourth Industrial Revolution. On behalf of SDPI, I would extend all possible research, training, and policy outreach support to the Government of Pakistan in turning our country to a *Naya Pakistan*.

Pakistan Paindabad.

Inaugural Address

# Fourth Industrial Revolution: Potential Impacts on Pakistan

*Dr Arif Alvi*

President of Pakistan

Dr Sania Nishtar, Special Advisor to the Prime Minister,
Mr Haroon Sharif,
Dr Abid Qaiyum Suleri,
Ambassador Shafqat Kakakhel,
Distinguished Guests from all over the world,
Ladies and Gentlemen,
السلام علیکم!

I am pleased to inaugurate the annual Twenty-second Sustainable Development Conference organised by SDPI. I would like to congratulate Ambassador Shafqat Kakakhel, Chairperson Board of Governors, Dr Abid Qaiyum Suleri and the entire group who consistently organise this event every year and develop policies and indicators of where the government and the people should be going.

The first question in my mind was how efficient is the communication of what you have deliberated upon and the take-up by the government since I have always been worried about this. I am a believer in think tanks, but there is usually a huge gap between what think tanks produce and what governments adopt or do.

**I have been pushing that deliberations such as the SDC must be more productive, and I am glad you have given me a book to read.[1] I hope policymakers, ministers, and the other relevant people would go through it.**

It is very important that when very well-educated, intelligent people like all of you here, think about something, it is well communicated in the corridors of power so that it becomes important and is implemented with efficacy.

The title of this Conference, of course, is also important. How can the Sustainable Development Goals (SDGs) or sustainable development in a digital age respond to what

[1] Editors' Note: The SDC anthology *Corridors of Knowledge for Peace and Development* was launched by President of Pakistan at the Inaugural Plenary on 2 December 2019 at the Aiwan-e-Sadr.

the people want? How is the digitalisation of almost all communication and data happening at the same time and becoming interconnected?

With Artificial Intelligence or AI and the ability to organise data, there are many questions which are coming up. All of us are very convinced that the Fourth Industrial Revolution is going to be very important and it has already affected our lives from communication to finance. In every field you can name, it has affected our lives.

In Pakistan, we are concerned about how to quickly jump on this wagon and how to change the destiny of the country, more than actual brick and mortar kind of development.

**I believe this intellectual change, which is happening probably makes it easier for Pakistan to be able to utilise new technologies and jump faster into the rapid developments the world is witnessing today.**

However, like it was mentioned by Abid Suleri that there are positive aspects and there are negative aspects of various technologies and those bother me.

The positive aspects are very profound. For example, in health - the biggest impact of information and knowledge throughout history has to be in health – the ability to feed the population and to keep it healthy. Technological benefits in the health sector are tremendous and within Pakistan's reach.

Let us take genetic engineering and I will talk about negative aspects of the same. It is about the ability of Artificial Intelligence and improved data to be able to develop new drugs, develop new materials much faster rather than just feeding data into logic circuits which was the ability of the Third Industrial Revolution.

**The Fourth Industrial Revolution is beyond crunching data, it is about artificial judgement replicating what neural networks in our own mind used to do.**

For example, the brain [absorbs] a lot of data. But, today given the amount of data available, and the amount of knowledge available, hundreds or thousands of human brains would be required to be able to store that data, [and to use it in order to make an informed] judgement. Our minds have an efficient way by which we limit the information which we store. The brain stores information that it considers important and based upon that, we make judgements.

**We have closets and cupboards in our mind wherein we place people, we place ideas which are important. Those which are not important get rubbed and scrubbed off.**

AI can process millions of pieces of data much more [efficiently] than what our brain can absorb. For example, a radiologist could look at an X-ray, having experience of looking at 400,000 of these in a lifetime, based on which he can make his diagnosis. But AI, with the ability of recognition of images, like facial recognition technology, may screen an X-ray while referring to a billion others in a fraction of a second while making its diagnosis. While this is an advantage, due to this, some jobs would become seriously challenged.

There are philosophers and scientists who are discussing the possibility of *The Industries of the Future* like the book by Alec Ross which looks at the possibilities when people will need to be retrained, otherwise they will be jobless.

**So, retraining facilities would be required. Pakistan [may] not be facing this [at the moment], but what Pakistan is faced with is the challenge to improve our financial inclusion of women, of deprived people.**

The *Ehsaas Programme* is endeavouring to address these challenges under Dr Sania Nishtar, our very hardworking Minister. I must commend her for the hard work she puts in and the intellectual capacity of being able to understand all these areas and processes. The Benazir Income Support Programme (BISP), for example, has been giving money to the poorest of the poor [in order] to sustain them, to lift them out of poverty. It has been championed by help going to women, but once you develop a digital platform by which you can send money through a digital payment system directly to a woman, and it automatically opens an account, imagine how quickly such savings and the entire system would help improve digital commerce at the lowest levels and empower women and bring them up. So, under the *Ehsaas Programme*, there are great possibilities.

Look at the possibilities in agriculture, where I am worried that we need more technological innovation. Imagine that an agriculturist needs to understand what crop is growing, the climate which he is facing, the soil which is there, how much water is needed, and what nutrients are needed. Rather than bulk throwing pesticides or fertilizers onto the field or not understanding how much water is needed to inundate the soil or letting the soil dry, what is needed are simple digital implements which can be put into the soil and every square foot could be monitored for what it needs at what time and how much. This could bring a revolution as soon as we are able to implement it.

Then, of course, education – whether it is educating people through distance learning or sending them abroad to do their PhDs where they may work for three or four years, and then, they come back and start [transferring] that knowledge which they have acquired, knowledge is now there in the Cloud today.

We have to understand that the First Industrial Revolution led to factories. We decided that in education, too, we needed 'factories' like schools and universities. These are factories, these are mass productions. From one class, you go to the second class, the third class and the fourth class, and we are producing people in these factories ultimately. But now, there is a world beyond these factories, the ability to reach out into the Cloud, rather than be restricted to 'factories' - brick and mortar schools.

**Now, there is the ability to reach out and educate and improve peoples' learning though digital media like the Khan Academy. This is what the world is now trying to comprehend. Pakistan needs this not only in primary and secondary education, but in higher education - the ability of massive online open courses, books - to get information in real time rather than people physically going out. We do not have to send our people abroad. We have to get information here and the knowledge into Pakistan.**

Imagine the change which can happen in trade. When I was growing up, the biggest information, traders used to hide was their suppliers and the people they used to supply to, but today, you go on the Internet, everything is available to you. So, there are a lot of positive aspects.

Stephen Hawking in his book *Brief Answers to Big Questions*, and the philosopher Harari talk about the dangers of the digital intelligence network which is being propagated. The most important part which I can just narrate to you is that our own evolution has happened in a very chemical manner. Change in DNA, in our history, in our life cycles is almost impossible but over a millennia, our thinking, which is actually a chemical algorithm has changed - a change in the structure of understanding which has taken tens of millions of years, but the algorithmic change of understanding on the same level of neural networks, on the same arguments, takes days today.

We are faced with major ethical challenges.

Is humanity ready for a specially modified human efficient intelligent human race?

A species which can be created - the possibility is there.

This is not a philosophical question anymore. If you allow that to happen within 10-15 years, there will be genetically modified children who are better and smarter and more disease-resistant. You've done it to crops, it can be done to human beings.

There are ethical barriers or ethical issues which one needs to think about, and in fact, throughout history, mankind has not been able to think about and settle these things. Every invention, for example even of gunpowder or bombs, you name it, has been used

in both ways, in good ways and in bad ways. Nobody has been able to control it because governments want an advantage.

**The Fourth Industrial Revolution has the ability to influence my mind in a unique way and that has been seen in election processes. It is no longer about faking ballots, it is now about the ability to modify the thinking of a group of people and to use their own biases that make us prone to even a small amount of fake news or overburdening of real news in a certain way that can influence decision-making of humankind.**

I give this example quite frequently that WhatsApp revealed that 80% of WhatsApp messages during Indian elections were fake, and people believed that those messages were true. So, those are the dangers when our people may be influenced in a certain way which may not be right or wrong.

What is right and wrong anymore?

Right is good for society today. For example, there is a very good article that we have to look at about the disparity between the rich and poor and sustainable development looks at this issue. It especially looks at how the disparity between the rich and poor has been increasing. With AI and software technologies as they are developing, this disparity has been increasing.

You must have seen the full-page advertisement in *The New York Times* today by Klaus Schwab and the World Economic Forum asking multinationals specifically, and all companies generally to do four or five things. What are they? To be responsible to their own workers; to be responsible to their clients; to be responsible to their suppliers; to be responsible to the community where they live; to be responsible to the generation with which they are working; to be responsible to the future generations as far as the environment is concerned and to remain responsible to the shareholders.

Companies, if they focus only on profit, and do not consider the health of the people, the community, their workers and suppliers, then, there will be irresponsible multinationals all over the world.

It is very important that even governments should also be thinking of the same things – the people and the communities they serve. When the United Nations was created, it was the big governments that needed to be controlled - big governments and their power of weaponry - needed to be controlled in the late '40s and early '50s.

**Today, Facebook is bigger than governments and governments are appealing to Facebook to stop this, do this, do not do this. So, somewhere along the line, we have to look at what society is going to face - the ability to use Artificial Intelligence in cyber wars or developing instruments and drones capable of creating havoc.**

These issues have been a matter of great concern recently. The United States said that after the Gulf crisis, it blocked Iran's entire ability to gather naval information. This issue is important for Pakistan as well.

Those of you interested in health and the possibility of AI must read the book *Deep Medicine* by Eric Topol which relates to what can happen in health and what we should be looking at.

I wrote an article in one of the newspapers as soon as the government gave me this responsibility. I talked about AI and the need for Pakistan to jump on this right away. I believe that we need to educate the human resource which will drive this engine. We are missing the human resource.

Let me give you an example - we produce 26,000 graduates in software or in IT, but only 6,000 are employable. The rest are not. Therefore, in the 200 universities in Pakistan in the public sector and about 25 universities which are directly under the President of Pakistan, we need to improve teaching so that we can produce people who will be good for us.

I went to Tokyo and met the Prime Minister of Japan, Mr Shinzō Abe. We talked about different issues and I mentioned that we have a young population. He said if you could produce 100,000 people in IT, we will employ them right away. Then, the Ambassador of Germany, who was leaving Pakistan, said we need 100,000 people. Then, our Silicon Valley friends of Pakistani origin tell us we need a 100,000 people. But, we are producing 26,000 and 20,000 of them are not employable.

There is a gap between what is available, what the market wants and what we are producing and a huge gap in numbers and quality. Therefore, I need to influence this. I have taken the responsibility myself rather than throwing it on someone else. There's a programme which is final and will start in June 2020. Its PC-1, for those who are familiar with Pakistan's public sector documentation movement, is ready. We will bring trainers here to train the trainers in Pakistan and be able to overcome this gap within about a year. This is important for education.

At the lower levels, rather than continue to build and invest in brick and mortar schools, we should reduce the investment there, have it, but reduce it and to look at the Cloud and the tablet to educate our children. I tried this in my own constituency where 20 children went into a regular brick and mortar system, and 20 were exposed to tablets for the first time - this was class one - and we found that children who started with tablets and its available resources were far better in learning than the children in the brick and mortar system. Therefore, whether it is education at the lower level or the higher level, we have to think about how to improve it.

Fake news is very worrying as far as Pakistan is concerned. Not only Pakistan, but the whole world is worried about fake news right now. This is something you can deliberate upon and come forward with some proposals on how to control fake news.

FinTech, the ability to make digital payments, can help make documenting the economy more easier as well as empower everyone and increase commerce which is important.

Outreach - Dr Sania Nishtar talked about outreach to people at least in health and explained what is possible and what is happening right now. What she talked about - the woman in Thar - is actually happening right now.

**We, in Pakistan, should dream about how we want our world to change for the better. An important aspect in this regard is fast decision-making. In this digital society, decisions have to be made faster than they were yesterday.**

As far as Pakistan is concerned these decisions should have been made yesterday. However, this does not matter, we have now and we have the time to improve on our past.

Entrepreneurs should be encouraged in every field. With this new ability of software development, developing apps, developing programmes, people have become millionaires or billionaires in three or four years (rather than 50 or 60 years like it happened for many construction magnates I speak with) and have sold their companies for three to four billion dollars at least. So, maybe investors with traditional mind-sets should consider putting their money in the IT sector which has greater returns over shorter duration.

**We need to improve our intellectual capacity rather than just industrial capacity which requires billions and billions of dollars. Improving intellectual capacity can be done in peanuts.**

The next important question is data. How do we handle data? The world is still confused about this. Pakistan has a lot of data in different sizes.

We have NADRA.
We have the *Ehsaas* Programme.
We have health data.
We have communications data.
We have banking data.

We should be able to ensure that our data remains secure and we should analyse data ourselves.

When we produce a lot of people in AI as well as in other areas of IT, we should not make the same mistakes we did in the '70s, '80s and '90s. We produced the best people in health. We produced doctors, and then, we exported all of them. They are serving other countries. We do not want to do this with our IT professionals. We want them to be able to stay here and get employment as well. Our own institutions need to come up with ways to use them.

**We need to produce people and we need to be able to use our own people for the development of society.**

I look forward to your important deliberations. The Government needs all possible help in understanding this new phenomenon, which is going to change society, which is going to change humanity.

**Some people are very pessimistic that this human race will not survive, but that just tells us the importance of learning how to manage technology for its positive applications. This also means understanding and being cautious of the possibilities of Artificial Intelligence and IT being used in a manner which is destructive.**

In the end, congratulations to all of you for the good inputs which I received in the form of your book, and thank you very much for listening.

Keynote Address

# From the MDGs to SDGs: Pakistan's Digital Governance Future

*Dr Sania Nishtar*

Federal Minister and Special Assistant
to the Prime Minister of Pakistan for Poverty Alleviation and Social
Protection, and Chairperson, Benazir Income Support Programme

Your Excellency Mr President, Dr Arif Alvi,
Colleagues at the head table,
Excellencies, Ladies and Gentlemen,
السلام علیکم and Good Afternoon!

I want to congratulate Dr Abid Qaiyum Suleri for hosting yet another important meeting. The series of Sustainable Development Conference is an annual feature, held every year in December. This is the first time that it is being held at the Presidency. This is an indication of the importance that our government gives to academic pursuits.

Since this Government came into power, we have opened the doors to such conferences, to the public, and if you go to government houses, citizens have the pleasure of roaming in the gardens. The Prime Minister Secretariat is open for meetings with stakeholders. I think the Presidency wins the honour of hosting the largest number of academic events. Thank you, sir, for opening your doors and heart to such academic pursuits.

Dr Abid Suleri has focused consistently on sustainable development for the last several years and I think it is important to understand the transition that has happened from the days when we used to talk about programme and aid to an era of sustainable development. Since I recall, and since I have been active in my professional life, I have seen a number of different transitions - digital transitions.

**There was a time when we used to focus on Project Assistance, then came the era of Programme Assistance, then Pakistan saw two successive years of State Aid Grant (SAG), then came the Millennium Development Goals (MDGs) and the focus was squarely on the MDGs for several years and then came the era of Sustainable Development Goals (SDGs). It is important to appreciate the change in dynamic, the change in framing, the signalling of the priorities that this transformation has ushered in.**

I would like to highlight a couple of differences to bring to bear the importance of this change.

The MDGs were very influential in their own right. It was for the first time that donor governments and recipient countries rallied together behind a set of goals. The private sector, civil society also aligned behind those goals. It was for the first time that development goals were insulated by vacillations that are inherent in changing governments. The MDGs were very profound. The world was able achieve a lot as a result of the focus on the MDGs, but the MDGs also had many shortcomings, which the SDGs have attempted to overcome.

The first shortcoming was that the MDGs had a silent approach. They were very prescriptive, narrow, time-bound and outcome-based. They focused on a few goals only, and a few sectors only. Of course, the world was very different when the MDGs were framed. The G8 donors were rich and the compact was a North-South one - a donor-recipient one.

**The world is very different now. Hence, the SDGs do not focus on time-bound outcome goals, rather a certain set of goals that countries are encouraged to pick from based on what their priorities are. The SDGs are very systemic in nature. They are sectorally not time-bound nor outcome-based. They are systemic in nature, which is a very important and a profound difference.**

The second difference is that the MDGs were donor-to-recipient, while the SDGs are supposed to be owned and led by countries themselves. The third difference is that for the MDGs, the frame of reference was governments, but in the framing of the SDGs, it is very explicitly stated that in order to overcome the constraints that countries face, civil society and the private sector have to be part of the solution. This is clearly a very profound departure in the framing in the UN system in terms of how it looks at contributions of the private sector. The other difference relates to the fact that there was no focus on systemic constraints. So, corruption and accountability were taboo words for the MDGs.

**In the framework of the SDGs, systemic constraints, accountability, independent accountability, accountability for results, the notion of addressing corruption is very much part of the recipe to overcome the development constraints that the world faces.**

Along with this is the need to disaggregate data. It is useful for gender outcomes, among others because the averages tend to hide the inequities, which was very much the focus of the MDGs.

So for a number of different reasons the SDGs, which countries are meant to own and frame, are very empowering for nation-states and that is how exactly it should be.

About the same time that the SDGs were framed, there was also another very profound development in the international circles, which was the switch in the financing construct because previously, alongside the MDGs, came the Paris Declaration on aid effectiveness, the Accra Agenda for Action. That framing changed when the Addis Ababa meeting happened back in 2015,[1] again signalling that countries are meant to mobilise indigenous revenue, address corruption, collusion and systemic inefficiencies and take responsibility for development – that here is the set of 17 goals in a time-bound, outcome-based matrix which we have constructed through an inter-governmental process, but ultimately, it is your responsibility to own what you would like.

Alongside came the era of human capital development because now research tells us that the most important wealth of a country is its human resource.

**It is not physical capital. It is not environmental capital - 60% of the wealth of a country can be attributed to its people. So profound is this realisation that as soon as it is 2025, the International Financial Institutions will start ranking countries for their borrowing costs according to their human capital rankings, which means if the social indicators of a country are lagging, their borrowing costs are going to be higher because they are more likely to default.**

Another important difference between the MDGs and SDGs is that SDGs are meant to be a whole-of-government approach. There is no room for a sideline approach within the SDGs.

What I have tried to emphasise in the last couple of minutes is that the world has really shifted in terms of how it looks at development, and of course, our leaders have been signatories to those agreements.

I would now like to spend a couple of minutes explaining the *Ehsaas* Programme and how the *Ehsaas* Programme resonates with the spirit of the SDGs.

**This is not a compact, which is developed with consultants on loan from abroad. *Ehsaas* was developed by people on the ground, taking stock of the limitations that we have and the opportunities we are likely to reap.**

*Ehsaas* is a multisector and multi-component initiative, arguably one of the most ambitious development programmes a government has ever espoused in this country,

[1] Addis Ababa Action Agenda of the Third International Conference on 'Financing for Development', 13-16 July 2015.

and we have the complete support of His Excellency the Prime Minister and Excellency the President for the compact that has been created.

This project is an umbrella initiative, with 134 programmes, policies and initiatives and it resonates with 10 of the SDGs. I will quickly go over some of its features.

**Firstly**, it is a whole-of-government programme, 34 federal ministries, and all provincial governments are contributing to this programme in a synchronised coordinated manner.

**Secondly**, it is a programme that proactively involves the private sector in execution. Even over the last six months, there are many examples of how this is mainstreamed in reality. We have done the procurement of a digital payment system over the last couple of months. We have contracted our work around access to finance 22 NGOs. We mainstreamed the role of a Karachi-based NGO that could do soup kitchens very well. We have a hackathon, first in a series of hackathons to develop a campaign on malnutrition. Today, I am going to be hosting the Women's Chambers in the Prime Minister Secretariat, just to let you know that there are very structured mechanisms of mainstreaming the private sector into our work and our planning.

**Thirdly**, in terms of how *Ehsaas* resonates with the Sustainable Development framework- as you know on 12 November [2019], the Cabinet approved the *Ehsaas Governance and Integrity Policy* - a comprehensive [set of] 22-27 policies, which are meant to plug leakages and pilferages from the system.

One of the four *Ehsaas* pillars is its Human Capital Development. We look at malnutrition in all its forms. Gender is mainstreamed through and through in the programme with many threads, and if I start talking about it, we may take another hour so I will pass.

**Technology is a very key feature for the door-to-door, end-to-end digital survey that is currently in the field, for our digital payment system, for the precision safety net, which is going to be launched in February [2020]. Technology is at the core of the precision safety net we have created.**

So, let me talk about technology more broadly as part of the Sustainable Development framework aside from *Ehsaas*. As you know, our Government is very squarely pursuing this agenda. We are cognizant that we are living in a country where this evening your children will order a pizza or an Uber and the same businesses in the private sector will deliver trackability, transparency, accountability to you.

There is no justification for public sector institutions not to be taking advantage of these technological capabilities to plug the leakages, pilferages and inefficiencies from

the system that we know exist and the government is squarely focused on that. Whether it is in the ubiquitous deployments of the e-office and e-procurement or whether it is full conversion to e-revenue or whether it is taking full advantage of the data analytics capacity of NADRA or whether it is the targeting mechanism that is implicit in the national social economic registry, the work that I lead.

**There is every effort by the government to make sure that we make use of databases, connectivity and technology. This is also not just about systems. It is also about enabling the environment for them.**

This enabling environment comes through handsets. With past experiences, we saw that if the cost of the handset is high, digital solutions are not going to work because they will not be in the hands of poor people. So, there is concomitant effort to reduce the price of handsets. There is also an effort underway to increase the footprint of connectivity.

For example, our work for procurements is underway to get a digital, online education system that the Government would pay for that could provide free resources, especially to the far-flung areas. Our procurement is ongoing, another three months and we will have the solution for scale-up.

Secondly, the agriculture value chain and the rural transformation value chain building policy, and the work that is underway will ensure that digital solutions are embedded in value chain efforts. An expert group is meeting and will very shortly come up with recommendations and many international partners are involved in this with us. As you may all know, the Prime Minister has already approved the policy of access to cell phones for seven million women to get stipends through BISP under the *Ehsaas* framework.

A number of efforts are underway, and I have not talked about some of the run-of-the-mill things like using our GIS mapping system better or using GPS positioning better to address the worker, or using video surveillance to look at absentees - many things are underway in different sizes and shapes in different departments involved in *Ehsaas*.

Mr President, the day before yesterday, I was speaking at the convocation of the Aga Khan University and time pressed as we always are, I was scrambling to write my speech as I was flying there. I was trying to give them an example of how technology will and can change the world within a matter of months. I thought of narrating a hypothetical story to them.

> In 2025, a woman in Thar, where there is no water, little food, no health facilities, no incentive for a doctor to go, it may become entirely possible for her to manage her diabetes with a cell phone, in an environment where

> Artificial Intelligence can completely make up human strategies. It may become entirely possible for her, through a microchip in her pill, and a wearable sticker on her skin to send signals to her secure electronic medical record in the Cloud that is secured by Blockchain Technology. It is entirely possible that the data algorithm will analyse it and will automatically alert the woman through signals, telling her that she needs to go to the doctor. Then, the same system could book a doctor's appointment for her through Uber, send her a cab and deduct money from a mobile wallet. The doctor could ask her though an SMS to send her retinal image and before she arrived there, the doctor could have tested it on a laser machine and send signals for medicine which she could either print at a local pharmacy or she could order through Amazon or it could be delivered to her doorstep through a drone.

By 2025, this may not sound like science fiction. The individual components for such a digital transformation exist today, and it is just a question of incentives to join the dots. Imagine the transformation this could bring to the world and to the deserts of Thar and to our coastal areas. Countries, like ours, could jump start by leaps and bounds in a matter of months or even a year perhaps - a transformation that has not previously happened for decades. Imagine the potential of this, when countries are going straight from no-digitalisation to 4G and 5G. We could change the world completely. But, it is a question of the incentives we offer to the market to invest in such digital transformation. It is the role of the government to invest in such policies.

This is what we are trying to drive through *Ehsaas*. But, in order to do so, we need new designs for institutions, new norms, new regulatory frameworks and new skills, which my colleague also talked about because someone once said, and I want to end on that quote, that:

> **... when the first industrial revolution happened, the cottons mills of the First Industrial Revolution increased the demand of unskilled workers, and today's Fourth Industrial Revolution does exactly the opposite, it increases the demand for skilled workers.**

I completely agree with my two co-panel speakers that it will ultimately be the incentives the Government provides to the market to shape-up and the skills of the human resource within the country which will determine whether that woman in Thar will have end-to-end healthcare. I believe it is entirely possible.

Thank you, Mr President for your leadership in these areas and thank you for your personal acumens, your wisdom and for opening your heart to such wonderful events, which I am sure will accelerate.

Special Remarks

# Digital Adoption, Growth and Labour Market Dynamics*

*Haroon Sharif*

Former Minister of State & Chairman Board of Investment, Government of Pakistan

**Abstract**

*The fast pace of digitalisation of economies is impacting lives in both developed as well as developing countries. As a matter of fact, a number of developing economies have achieved higher levels of digital adoption as compared to many developed economies. Emergence of the Fourth Industrial Revolution (4IR) is based on rapid growth of knowledge-based economies which will have a profound impact on the nature of jobs, income levels, markets and overall human interaction.*

*While looking at various potential impacts of digital adoption, this paper highlights the risks, opportunities and relevant policy responses to deal with changing job profiles, income inequalities and possibilities of leveraging digital technology for fostering economic growth in transition economies like Pakistan.*

* This paper is based on the Special Remarks presented at the Aiwan-e-Sadr (Presidency) in Islamabad, Pakistan at the Sustainable Development Policy Institute's (SDPI) Inaugural Plenary of the 22nd Sustainable Development Conference on 2 December 2019.

**The foundation of digital economies relies on analogue structures of flexible public policies. A fundamental policy shift is required to change the traditional ways of skills development, service delivery and productivity to realise the potential of digital adoption.**

## Introduction

The fast pace of digitalisation of economies is having a profound impact on the lives of people, governments and markets. As more and more people adapt to the digital economy, policymakers need to think swiftly and carefully about devising policies that will maximise the benefits of a digital revolution, while mitigating the risks of job dislocation. Digital progress is the result of a general-purpose technology that has the flexibility to transform itself as the driver of change for boosting productivity across all sectors.

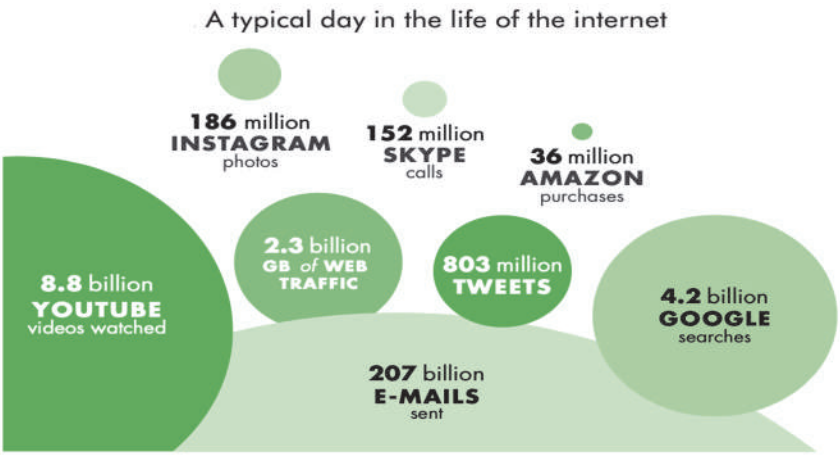
**By reducing the cost of information, digital technologies could greatly reduce the cost of economic and social transactions for firms, people and public sector.**

Taking a glance at the history of technological advancements, only three inventions have had a real transformative impact on growth – the steam engine, electricity generator and the printing press. Like all revolutions, the current general-purpose technology revolution is highly disruptive, and economies will have to deal with challenges of rising inequality, unemployment and privacy concerns.

The digital revolution is well under way and is transforming jobs and skills. It is also impacting the parameters of large-scale manufacturing, retail, banking and logistics businesses. Digital transactions are increasing rapidly and have already reached 20% of overall transactions in developed economies like the United States (US), United Kingdom (UK) and China.

Digitalisation will have a serious impact on jobs transformation. A study conducted by McKinsey Global Institute in 2017 predicted that one-third of the US workforce is likely to go through job reprofiling by 2020. We are entering a new marketplace of smart phones, robotics and Artificial Intelligence. There is no turning back now as digital technology is expected to accelerate its pace in the coming years.

**Figure 1: A Day in the Life of the Internet**




*Source:* World Bank 2015, 'World Development Indicators' (various years); World Development Review 2016; and Internetlivestats 2015.

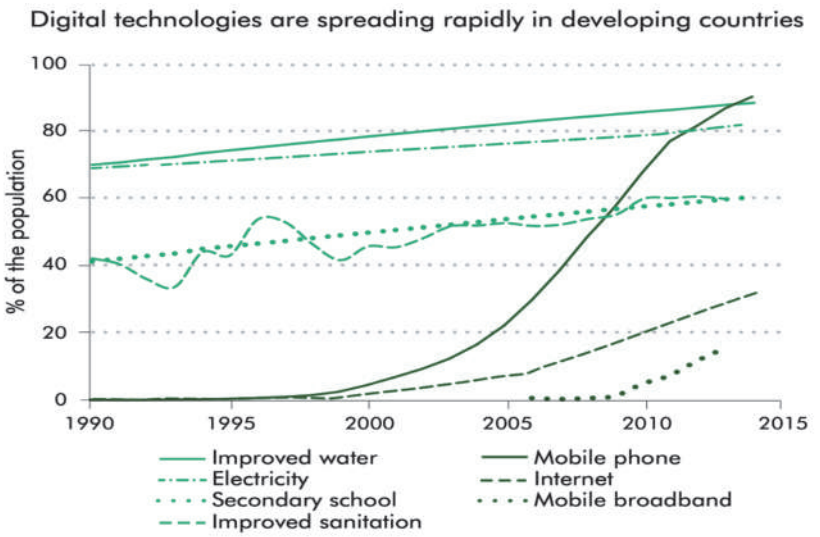
## Opportunities for Developing Countries

For developing countries, there will be pressures on delivery of skills, labour migration and productivity. One of the striking facts is that less developed economies are quickly adopting these technologies, and are taking a lead on the usage of digital technologies like e-payments in Kenya, land registration in India and e-commerce in China.

**Special attention will have to be given on potential exclusion of the workforce whose skills have been degraded and the potential threat of further concentration of wealth.**

According to analysis by *The Economist*, the wealthiest 10% hold 82% of global assets and the bottom 50% people own less than 1%. So, power dynamics will have a profound impact on politics and the job market. It is critical for developing countries to invest in understanding the impact of the digital economy as reorganising the economy around transformational technologies could result in huge gains to offset the costs of dislocation of jobs. Quick expansion of digital adoption could lead to a hollowing out of the labour market and to rising inequality.

**Figure 2: Rapid Spread of Digital Technologies in Developing Countries**




*Source:* World Bank 2016, 'World Development Report 2016: Digital Dividends', Washington, D.C.: The World Bank.

**Four drivers of change are expected to influence business growth in the next five years – high speed mobile internet, Artificial Intelligence, widespread adoption of big data analytics and Cloud technology.**

According to a survey conducted by the World Economic Forum, 50% of leading companies think that they will have to reduce the size of their labour force by 2025. In 2018, 71% of tasks were undertaken by a human workforce, whereas in 2022, 58% tasks will be done by humans and 42% by machines. The general trend reveals that more jobs will be required in non-traditional and specialised fields linked to digital technologies.

## Sustainable Policy Shifts

### *Changing Skills Mix*

The skills mix required to succeed in today's labour market is changing from what the traditional old school has been teaching us. However, the education and skills development systems are failing to catch up with the pace of change.

**A skilled worker in the digital age will need flexible skills which are transferable from one industry to another in response to labour market demands.**

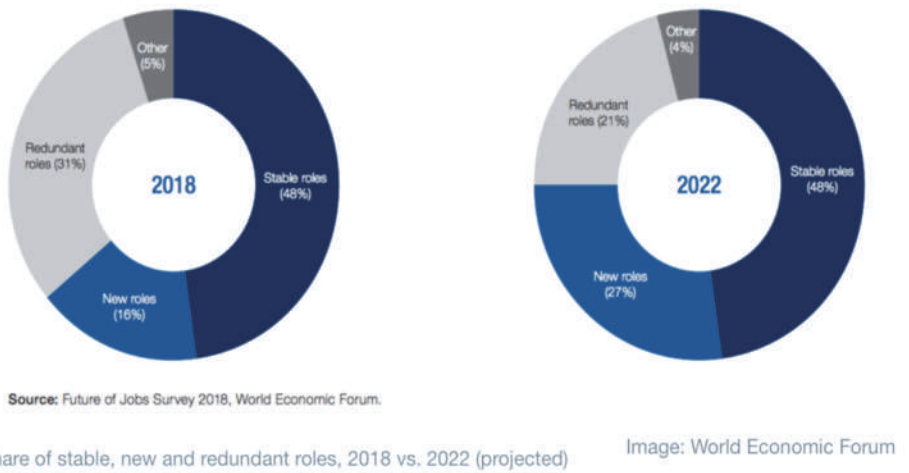
While a digital economy could accelerate the pace of labour market dynamics by opening new opportunities, it could also make several traditional skills obsolete. This change requires more adaptability and flexibility among firms and individuals. As a policy intervention, this calls for stronger lifelong nexus between the industry and training institutions.

**The focus of public policy in skills development has to move towards ICT skills, Science and Mathematics, problem solving and life-long learning.**

## *From Efficiency-Based Skills to Knowledge-Based Approach*

For transition economies, rethinking curricula and teaching methods must become a priority for policymakers. The analogue agenda for building foundational skills starts at an early age. But, young schoolgoing children now need to learn on digital lines through laptops, internet and mobile phones. In addition to foundational skills, workers will be required to learn more about problem solving, teamwork and digital communication.

**Figure 3: Future of Jobs 2018-2022**




*Source:* WEF 2018, 'Future of Jobs Survey 2018,' World Economic Forum.

In countries, like Pakistan, where a large number of young people are regularly entering the job market, policy interventions to create linkages with advanced curriculum through digital partnerships may lead to catching up with required skills in a timely manner. More and more online learning platforms are emerging like the successful initiative of Khan Academy which provides free lectures, problem solving and mathematics skills.

The greater challenge for Pakistan is to reach out to illiterate adults who fear the digital change. As one of the most adaptive digital economies, Singapore made a structural shift in 1977 from efficiency-based skills to a knowledge-based skills model.

## *Institutional and Technology Gap*

There is a clear gap between institutions and technology in many countries. Mostly, governments are adopting technologies for service delivery, but have not done much to empower citizens to hold them accountable. The bureaucratic structures remain patronage-based with a focus on service delivery. The policy priority in such conditions should be more to change the incentives for institutional reorientation and coordination.

**It is easier for countries with digital population registers to target policies across age and income brackets. By reinforcing targeted interventions through digital technologies, governments can start bridging the gap between institutions and technology.**

## *Science and Mathematics Foundation*

South Asia has the competitive advantage of a young, educated population with lower median wages than the West. Academia and industry need to invest in their students and employees by offering relevant training programmes to prepare them for the future job market. Governments could help spur innovation and be a strong support system for the manufacturing sector by creating Special Economic Zones (SEZs) for micro, small and medium-sized enterprises (SMEs) with benefits such as import tax subsidies on equipment and infrastructure subsidies for setting up advanced manufacturing facilities.

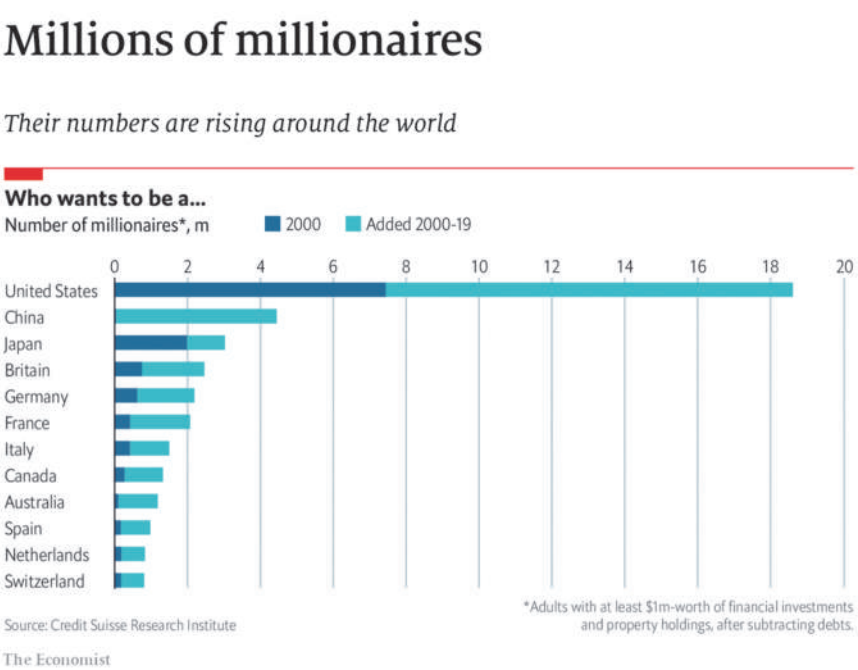
## *Digital Safeguards*

Polices on digital safeguards are critical for keeping the cost of doing business competitive and controlling potential polarisation within the labour force. Professor Klaus Schwab (2016), Founder and Executive Chairman of the World Economic

Forum, says that stakeholders need to adopt an 'agile governance' model for regulating technology and making constant adjustments with its evolution.

**Agile teams that constantly evaluate and fine-tune policies to enable the adoption of new technologies will provide a strategic advantage to governments and organisations hoping to thrive in the Fourth Industrial Revolution (4IR).**

**Figure 4: Increasing Number of Millionaires 2000-19**




*Source:* Credit Suisse Research Institute and *The Economist*.

**It is crucial to build stronger links between governments that regulate technology, academia that nurtures new technologies, and industry that builds technology.**

## Conclusion

According to the World Development Report 2016, full benefits of the digital transformation will not be realised unless countries continue to improve their investment climate, invest in quality education, health and promote good governance. In countries where these fundamentals remain weak, digital technologies have not

boosted productivity nor reduced inequality. Several carefully thought out policy interventions will lead to reaping benefits of digital transformation in developing countries. The following approaches need to be taken to bridge the divide between academia, industry and government, which is hindering the adoption of innovative technologies.

**First**, a holistic revamping of the skills development model from an efficiency-based to a knowledge-based framework is needed. This will not only require a change of mind-set, but also massive institutional restructuring.

**Second**, investments will be required to build a supporting infrastructure like fast speed internet, digital transmissions and specialised technology zones that offer competitive incentives and a one-stop plug and play business environment. Pakistan should also think about setting up a large technology fund to support this transition. The developed world has already developed the basic industrial infrastructure and can move rapidly into the digital economy. The developing world is just embarking upon the industrial development phase.

**Third**, access to data will be key for future jobs and developing countries will have to come up with a regulatory framework to protect the privacy of their citizens. At the same time, digital technologies will fast-track expansion of companies, and there will be a risk of widening the income gap between the rich and the poor. A fast-paced marginalisation of small and medium-sized companies could lead to job losses, economic distortions and political instability.

Pakistan should see the digital transition as an opportunity to catch up with the economic development levels of East Asia. For that, it will be useful to start measuring progress towards the digital economy through a 'digital scoreboard' which could be updated on a yearly basis. One of its essential elements could be a composite index that summarises relevant indicators on Asia's digital performance and tracks Pakistan's competitiveness.

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# THEMATIC DISCOURSE

## CYBER SECURITY IN A DIGITAL SOCIETY

Cyber Security and Cybercrime in a Digital Society

Cyber Threats to Pakistan's Digital Landscape

Policy Paper

# Cyber Security and Cybercrime in a Digital Society

*Brigadier Mohammad Yasin (Retired)*
Senior Advisor
(Capacity Building),
Sustainable Development Policy Institute,
Islamabad, Pakistan

**Abstract**

As technology continues to advance, so do the opportunities and challenges it provides. With the increasing use of internet and its availability for all, the expanding cyberspace is making it easier for hackers and cyber-attackers to go on the offensive. As technology brings greater benefits like automation, Big Data and Internet of Things (IoT), it also makes countries and citizens vulnerable to sabotage, espionage, denial of services and terrorism.

Although Pakistan is cognizant of the impending dangers, its preparedness to meet the threats and its cyber security posture is weak. The country's approach is reactive, superficial and box-oriented. Even the agencies responsible for coordinating the security mechanism have half-heartedly been active to enforce cyber security measures and enact responsive laws to meet the increasing threats. The much-talked about Pakistan Computer Emergency Response Team (PAK-CERT) is nowhere to be seen. The much-needed collaboration, between the public-private sector and military institutions, is lacking.

This paper discusses Pakistan's current cyber security landscape, the challenges it faces, the need to revamp cyber laws and the measures needed to minimise critical infrastructure vulnerabilities and make the country's networks resilient. Finally, pertinent recommendations are made for consideration of policymakers, regulators and other stakeholders.

## Introduction

In recent years, the media has reported an exponential increase in cybercrimes in Pakistan wherein the attackers, in many cases, used ransomware to extort money from the victims. Pakistan's Federal Investigation Agency (FIA) reported 29,577 cybercrime cases over the past two-and a-half years, while the Agency reported 1,290 inquiries and 160 arrests in 2017 alone (Qarar 2018a).

Cybercrime/attack comes in a variety of forms, i.e. denial of service, attacks on websites, thefts, blackmail, extortion, manipulation, and destruction. The attackers can, at will, disable financial, electric grids and transport systems. The tools are many and varied in nature, which include malware, ransomware, spyware, social engineering, and even alteration in physical devices such as household appliances. The targets have even been cars and medical services. The paper aims to analyse the effectiveness of Pakistan's current cyber security posture and the challenges it faces. It also suggests solutions to address cyber security challenges.

## Methodology

This paper is the outcome of a panel discussion[1] where five professionals from the field of Information Technology (IT) were the speakers. The session was attended by 104 junior and senior specialists, consultants, policymakers, regulators, mobile and service providers. Military representatives also attended the participatory and interactive discussion. The paper is based on the presentations given by the speakers and the points that came out during the Question-Answer session and dialogue. The participants critically analysed the global and national cyber security scenario and made important policy recommendations. These recommendations were shared with policymaking organisations and relevant parliamentary committees.

## Discussion

### *The Threats*

Technology is advancing very fast and expanding cyberspace is making it easier for cyber-attackers, hackers, criminals, paedophiles and terrorists to go on the offensive.

[1] The Sustainable Development Conference (SDC) is an annual flagship event of the Sustainable Development Policy Institute (SDPI), wherein experts from all over the world discuss regional and global issues in different sessions. The theme of SDC 2019 held in December 2019 was *Sustainable Development in a Digital Society*. This policy paper was extracted from a panel discussion titled *Cyber Security and Cyber Crime in a Digital Society*. For further details, please visit <www.sdpi.org/sdc.php>.

As technology continues to evolve, it brings greater challenges. A significant number of developed and developing countries have suffered socially, financially and militarily. The print and electronic media frequently carry such disturbing news. There is a serious threat to data confidentiality, integrity and availability, which requires greater resilience of IT infrastructure.

## *Pakistan's Cyber Security Landscape*

### *Current Scenario*

In Pakistan, 37 banned extremist organisations run more than 400 social media accounts for recruitment and propaganda (Iqbal 2019). According to the International Telecommunication Union (ITU), the Global Security Index ranked Pakistan 94th out of 193 countries in its commitment to cyber security. Earlier, Pakistan was 64th. This is, because Pakistan did not show much commitment in areas of legal, technical, organisational capacity building and cooperation in the cyber security domain (International Telecommunication Union 2018).

Pakistan has been a victim of several serious cyber-attacks during the last few years. Though various organisations are aware of the impending dangers and their consequences, serious implementation of security procedures has been lacking. Despite having a large part of its population addicted to connectivity, the country exhibits a very weak cyber security posture.

**Instead of being proactive to face the looming threats, Pakistan is reactive. If there are any Standing Operating Procedures (SOPs), these are only on paper just to complete documentation. Even among the different departments of critical organisations, there is hardly any collaboration and common approach to cyber-attack vulnerability and ensuring resilient critical infrastructures. The public, private and military organisations are working in isolation.**

Pakistan has repeatedly been threatened by its hostile neighbour India which is spending considerable resources to prepare itself for a cyber war. Pakistan's websites have periodically been defaced, yet it remains indifferent to the dangers. It is interesting to note that almost all organisations in Pakistan have been found to be following strikingly resembling pattern of weak cyber security posture, irrespective of geography and company type (Mahmood 2019).

### *Recent Instances of Cyber-Attacks in Pakistan*

On 26 October 2018, Pakistani banks were hit by cyber-attacks. Data from 19,864 cards belonging to customers of 22 banks was stolen and put on sale on the dark web (Iqbal 2018). It was a coordinated cyber-attack in which the payment network of Bank Islami and international payment scheme were compromised. The Bank Islami lost USD six million in just 23 minutes (Qarar 2018b). Debit cards of 21 other banks were also put up on sale on the dark web.

In November 2018, the Pakistan Air Force (PAF) came under cyber-attack. A new campaign and malware hit PAF by a sophisticated state-sponsored actor in the Middle East. In a detailed report under the White Company Project, it was revealed how hackers belonging to the company not only targeted the PAF and other government organisations, but also used sophisticated tools and techniques to evade attribution (Pakistan Today 2018).

In February 2019, a number of Pakistani websites were hacked. It was reported that websites of Pakistan's Ministry of Foreign Affairs (MoFA) and the Army were hacked. The MoFA website was not working properly for users from Australia, Netherlands, Saudi Arabia, Britain, etc. (Siddiqui 2019).

During 2019, the Pakistan Navy was targeted to steal vital information. The attack was launched by the Advanced Persistent Threat (APT) organisation 'Rattlesnake' through the Target Threat Intelligence System. The Pakistan Navy's Public Relations Bureau was targeted to steal vital information by planting misleading documents shown as official statements from the Navy regarding China and India (Khalil 2020).

The FIA received over 56,000 complaints during 2019 and registered 1,086 cases. A majority of cases were related to sexual harassment, blackmail and obscene activities online (ARY News 2020).

## Prevention of Electronic Crimes Act (PECA), 2016

The Prevention of Electronic Crimes Act (PECA), 2016 aims to streamline cyber security defence and curb cybercrime. It covers offences like unauthorised use of identity information, unauthorised access to information systems/data, critical infrastructure, cyber terrorism, hate speech, electronic forgery, SIM cards, offences against dignity/modesty of a person, child pornography, cyber stalking, spamming, and email phishing.

However, an essential provision, establishment of Computer Emergency Response Teams (CERTs), is yet to be initiated. This means that timely and effective steps to

meet any cyber-attack will be a difficult exercise. PECA also does not have an effective provision for data protection.

**Critics have termed the Act a draconian law that curtails the right of freedom of speech enshrined in the Constitution. It is a poorly drafted, vague and ambiguous law, and was bulldozed through Parliament with inadequate input from the stakeholders. The law needs to be revamped.**

## Missing Essentials

Apart from issues with PECA, 2016, there is no security agency which lays down a national cyber security strategy and framework for regulators to enforce in public and private organisations. There is no National Cyber Security Policy to cater for required planning, capacity building and collaboration between the public, private and defence organisations. There is also no worthwhile capacity building programme for cyber security professionals, graduates and post-graduates.

**There is no tri-service (Army, Navy and Air Force) command to plan, collaborate and implement the required SOPs on cyber security. This is very essential because hybrid war is now replacing conventional wars.**

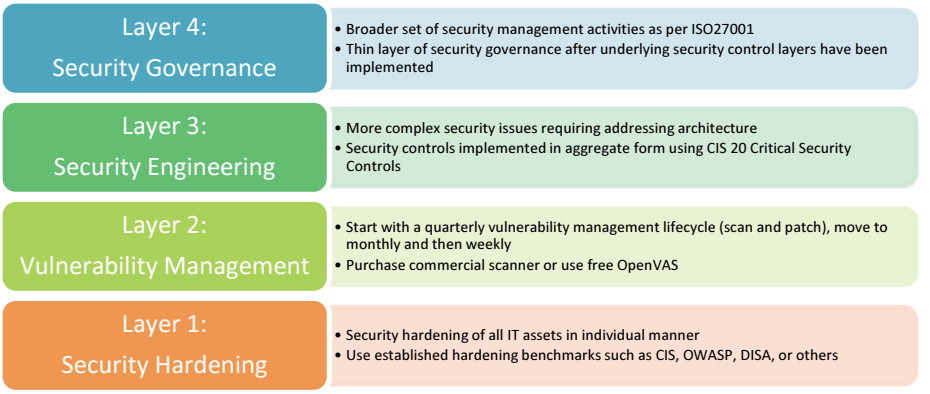
## Meeting the Impending Challenges

The challenge of defending against cyber threats is not only difficult due to their varied and diffused nature, but also because so much depends on how organisations prepare, react and respond to such threats.

**In planning various operations of war, the principle is that 'effective offence is the best defence.' But, in planning for cyber security, preparation and practice is the best defence. In other words, 'effective defence is the best offence.'**

The following 4-layer Cyber Security Transformational Model (Mahmood 2019) can facilitate planning and preparation to meet cyber security challenges (Figure 1):

**Figure 1: 4-Layer Cyber Security Transformation Model**




*Source:* Mahmood 2019.

The Cyber Security Transformational Model is a solution that can help meet several challenges. It is a 4-layer model covering Security Hardening, Vulnerability Management, Security Engineering and Security Governance. Mahmood (2019) also emphasised that effective security has to follow an ordered, proactive and structured programme rather than be a haphazard and reactive undertaking. Basic security measures (like regular vulnerability scanning, infrastructure and software hardening, enterprise protection, regular monitoring and enterprise securing through advance security steps) are essential for cyber security planning.

**Cyber-attacks are often varied and diffused. Every attack may be different from the previous one. Therefore, a static plan will not be effective for all times to come.**

To face cyber security dangers, Prussian General Helmuth Graf Von Moltke's warning, 'No plan survives first contact with the enemy' (Singer and Friedman 2011) gives an important lesson to plan for defence against cyber-attacks. Therefore, it is important that exercises and simulations to test the effectiveness of plans and procedures are included in the SOPs. Each practice will result in important lessons. The repetitions will allow cyber security professionals and other staff to learn from failures. This will help keep the plans dynamic.

## Policy Recommendations

The world is far more technologically advanced than it was a decade ago. Cyber security is something nobody can afford to ignore. So, what can Pakistan do to fight against the

growing threats? The following recommendations can be considered for future policy formation:

## *Cyber Security Capacity Development*

The capacity development for cyber security has to be at the same level as Information and Communication Technology (ICT) development. Strong cyber capacity is crucial for Pakistan to progress and develop in economic and social spheres. Cyber research must be encouraged and capacity building should be included as a concept in the field of sustainable development. This will empower individuals, industry, organisations and the government to achieve their goals by reducing security risks stemming from access and use of ICTs.

## *Establishment of National Cyber Security Agency (NCSA)*

For collaboration between the government, military and intelligence stakeholders, there is an immediate requirement to establish a NCSA. The Agency should formulate a National Cyber Security Strategy Framework aimed at defending economic assets and preparation against cyber threats. The Agency needs to implement national cyber security strategies, policies, laws, regulations and other national approaches.

## *Dynamic Planning, Exercises and Simulations*

Cyber-attacks are varied and diffused. Every attack may be different from the previous one. Therefore, a static plan will not be effective. It is important that exercises and simulations to test the effectiveness of plans and procedures are included in Standing Operating Procedures. Each practice will result in important lessons. The repetitions will allow cyber security professionals and other staff to learn from failures. This will help keep the plans dynamic.

**Effective security needs to follow an ordered, proactive and structured programme rather than be a haphazard and reactive undertaking. Vulnerability tests and practice exercises are valuable. In fact, these should be carried out on the pattern of war-gaming. Exercises do not just test the defences - they also help better understand the effects of plans and procedures.**

## *Establishment of Cyber Security Certification Board (CSCB)*

Risk assessment to reduce or eliminate vulnerabilities of critical information and infrastructure is important for regulators, researchers and the industry. Effectiveness

will depend to a certain extent on important administrative, economic and legal factors such as the dependence on cyberspace, the way in which government activities are conducted and the existing state of cyber security risk management. Therefore, CSCB should be established to conduct assessment of key organisations to identify, evaluate and recommend protection levels.

## *Review of PECA, 2016 and Other Laws*

Technology developments are outpacing the laws being proposed and implemented. The government is struggling to amend existing laws that seek to ensure the regulation of cyber security. PECA has faced a lot of criticism for violating the fundamental right of freedom of speech under Article 19 of the Constitution of Pakistan. It also tends to encroach upon the right to privacy and lacks futuristic technology upgrades. There is a dire need to revamp PECA and other laws in order to ensure not only the citizens' right to privacy and freedom of speech, but most importantly, the need to address the wide spectrum of problems relating to cyberspace.

## *Establishment of Tri-service Cyber Command*

The development of military cyberspace capabilities has progressively stressed the need to move beyond thinking of military roles in the simplistic terms of 'conventional war' and to focus instead on the appropriate role for the military's defensive and offensive cyberspace capabilities across a variety of situations, ranging from supporting civil authorities in disaster relief to responding to threats against critical infrastructure. Like any conventional military capability, they need to be organised, equipped, trained, and sustained at a high level of readiness. Therefore, in order to coordinate cyber security efforts, there is a need to establish a unified Tri-service Cyber Command.

## *Deployment of National Computer Emergency Response Team (CERT)*

The International Telecommunication Union in a recent publication 'Global Cyber Security Index and Cyber Wellness Profiles' ranked Pakistan at 94$^{th}$ place. The report pointed out that everywhere in the world, nations seem to have done more work on legal aspects of cyber security, but lack capacity to counter cyber-attacks. The report indicated that Pakistan lacks criminal legislation, and, while some private institutions have developed their own CERTs, there is none at the national level to coordinate and implement cyber security. It is time that Pakistan should have a CERT headquarters at the Ministry of Information Technology and Telecommunications with regional offices in all provinces for the security of national cyberspace.

### *Cyber Security Professional Degrees through Higher Education Commission (HEC)*

Talent and training constraints have a significant impact on security organisations. Resultantly, advanced cyberspace technology is required for deployment to offset the lack of cyber security experts. Pakistan has limited itself to the traditional understanding of Information Security. Very few reputable institutes have cyber security specialisation courses, let alone full degree programmes. The demand for specialists in the field is high. Job postings for openings in cyber security have grown much faster than those for IT. Therefore, to equip Pakistan with adequate professionals, the HEC should introduce professional degrees in all the universities.

### *Judicial Setup*

An appropriate judicial setup should be created to deal with cyber security violations and cybercrimes. In this regard, judges and lawyers also need to be properly trained.

### *International Cooperation on Cyber Security*

Pakistan is one of the most cyber spied upon country. There are clearly identifiable hurdles in establishing an effective cyber security architecture to coordinate efforts. Pakistan is represented at the United Nations (UN) Group of Governmental Experts (GGE) on Information Security, but the national theme is not shared with internal stakeholders. There is no mechanism of interstate understanding or sharing of best practices on a regional basis either. Pakistan should be an active partner in the efforts under the UN like Budapest Convention and those by the Shanghai Cooperation Organization (SCO).

## Conclusion

The strong and fluid elements of ambiguity and asymmetry are the new dimensions of cyber-attacks which require dynamism in building cyber defences. A strong cyber defence will be an effective cyber offence. But, Pakistan is significantly behind in building robust cyber defence.

**The country's cyber security posture is weak and non-responsive. The government's approach, to hovering cyber threats, continues to be reactive, superficial and documentation-focused. This poses a serious risk to critical infrastructure, and hence, to national security. The much-needed collaboration between civil and military organisations is weak. With non-hardened and non-resilient computer systems, the country is susceptible to cyber-attacks.**

The need to acquire requisite capabilities to neutralise possible cyber-attacks is now the most urgent and vital requirement. Cyber laws must be made responsive to cope with the changing environment. Pakistan needs to put on ground an effective Tri-Service Cyber Command without any further delay. Cyber security professionals need to be trained on a priority basis. Any indifference, procrastination or delay to acquire robust and dynamic cyber defence will be at Pakistan's own peril.

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Working Paper

# Cyber Threats to Pakistan's Digital Landscape

*Zaheema Iqbal*
Senior Researcher
(Cyber Security Policy),
National Institute of Maritime Affairs (NIMA),
Bahria University,
Islamabad, Pakistan

**Abstract**

The future of devices will be digital and automated. In an article in 2016, Amy Nordum predicted that around '25-30 billion devices will be connected to the internet by 2020', from driverless cars and industrial control systems connected to home automation and health monitoring devices. While increasing use of automated technologies, big data, the Cloud, Artificial Intelligence (AI) and Internet of Things (IoT) in many areas of business and society, have made life easy, at the same time, a whole new set of challenges related to cyberspace such as data privacy, security, storage, and online crimes has also emerged. Dealing with these challenges is a mammoth task and a serious concern since such advancements in the field of technology have also given rise to competition in cyberspace between nations where proxy actors and organisations have surfaced to fulfil their political agendas and ideological objectives (Hundley 1996). In Pakistan, cyber security is still a relatively low priority on the national agenda. It, hence, remains bleak and compromised due to lack of digital security measures in Information Technology (IT) infrastructure. The government, public and private sector have increasingly become vulnerable to new and malicious cyber threats. This chapter will discuss cyber threats to the digital sectors of Pakistan such as banking, telecommunication, energy and power, along with existing preparedness and degree of cyber security maturity adopted by the government. The chapter will also provide policy recommendations to the government and the military for improving the country's existing cyber security framework.

## Introduction

For decades, Information and Communication Technology (ICT) has been considered an integral part of power, diplomacy, and military. However, since the 1990s, the role of IT in international relations and security has diversified and gained significant importance due to the propagation of ICT and impact on countries, nations, corporate sector (public and private) and even peoples' personal lives. Therefore, cyber security has become a vital part of IT and a strong cyber capability has become inevitable for states to progress in all spheres of life (Pawlak 2014).

**As technology keeps progressing, the challenges and opportunities it offers, also evolve. The world is transitioning from an internet-entwined society to the age of automation and data revolution.**

In the era of the Fourth Industrial Revolution (4IR), information security and data privacy have become the biggest challenge. Today, societies are largely run by IT-based infrastructure, which in turn has created a huge dependency on technology. We live in a highly digitalised society where cyberspace offers an open platform to its users for interaction with friends and families. Whether we speak or discuss public, corporate, macro or micro economies, government or national level issues, data security and privacy are some of the biggest concerns across global communities. More than 65% of global commercial transactions are done via the Internet (Garner 2014). Despite breakthrough advancements in technology, new and innovative challenges to internet-based systems keep surfacing.

**Innovations in various fields such as Cloud and mobile computing, Artificial Intelligence, E-Commerce, IoT and online banking, are vulnerable to cyber threats due to the classified data they carry which, therefore, requires high level security physically and online.**

Cyber experts all over the world are constantly striving to identify counter measures as cyber threats grow exponentially. Cyber vulnerabilities pose strong risks to the prosperity, development and social harmony of any society. In 1995, only 16 million of the global population had access to the Internet. Today, more than half of the world's population has access to the Internet, and more than 50% of this population uses Wi-Fi on their mobile phones and wireless devices (ITU 2018).

The most common observation about cyber risk is that it is a global phenomenon, hailing from national borders and endangering the critical infrastructure and citizenry of developed and developing nations. A banal response to this is that all developed and under-developed countries need to come forward and work together to address this

global concern collectively as well as individually, with actionable insights which can be swiftly implemented.

Daily life and economic vitality of each society depends on a safe, secure, stable and adaptable cyberspace. However, cyber-dependent infrastructure is prone to various risks emanating from both traditional and digital threats. The United Nations Office on Drugs and Crime in its report stated that advanced, state and non-state cyber actors involved in cybercrimes make use of cyber vulnerabilities in order to steal and manipulate classified data for personal benefit and are strategically pursue expansion of their abilities to destroy and intimidate the national security of other nations (UNODC 2012).

Choo (2011) was of the view that in 30 years, digital societies would run on automated and driverless trains, buses, and cars. Teachers would be replaced by technology in the classrooms. Aircrafts would not need human authority to control them.

One can imagine a society in which technology may bring forth efficiency, cheap cost, reduced traffic jams, clean environment and much more. It may look like the Golden Age. However, along with this, will perhaps also appear daunting cyber security challenges and in case of an attack, it may cripple centralised Command and Control Centres responsible for controlling and managing transportation systems and infrastructure. This would result in a compromised transportation system, with no buses or cars. Routine life would come to a standstill, emergency services may begin to hamper, people may no longer have access to life-saving medicines, and consequently, they may suffer, i.e., fall sick or die. This chaos may seriously disrupt economies on micro, macro or even global level. A cyber-attack targeting a specific location, economy, infrastructure, facility or even a country can take place even without physically stepping on an external country's shore - this is a stark example of a cyber-attack in a digital society.

**A world where distances become meaningless due to technological revolution, needs to realise that cyber security in these unprecedented times is extremely essential, in fact, mandatory for everyday life.**

## Fundamentals of the Cyber Landscape

This chapter discusses the fundamental concepts of the digital landscape since the scientific characteristics of digital threats and relevant technicalities are beyond the purview of this study. In order to understand cyber issues within the social construct, relevant concepts include cyberspace, cyber threats and their implications on critical infrastructure and cyber security.

'Cyber is a contested term' which means different things to everyone. It should not intermittently be taken as something which is similar to the Internet (Futter 2016). Thus, the term 'cyber' may be associated with 'command and control of computers' and cyber-attacks can be understood as attempts to deny, disrupt, degrade, damage or destroy the information on which they are dependent, or which they generate (Ibid.). It has two other main features: online communication as its capability; and, electronic medium as its component (Fang 2018). Fang further elaborated that the space features include users, people, and places for communications. Altogether, cyberspace can be understood as 'time-bound' set of coordinated information systems, and people who use these systems. It can be said that apart from the Internet, connected/disconnected computer machines, telecommunications fixed and wireless networks, controllers and fixed processors are also included in cyberspace (Ibid.).

'Cyberspace' is defined by the United Nations as worldwide interconnected computer systems, video conferencing technologies, holoportation, communications infrastructure, information utilities and databases. The term 'cyber' is also known as a particular, bounded electronic information ambiance of a corporate, an enterprise, or a defence organisation (Mohiuddin 2006).

'Cyber threat' is defined as a potential 'activity which may culminate in an unauthorised approach to infiltrate, compromise and jeopardise confidentiality of information system which is stored on or processed by or carrying an information system' (Reich and Gelbstein 2012). 'A digital threat' can have two structures: digital or cyber exploitation; and, cyber-attack. 'Cyber exploitation' refers to obtaining confidential information covertly with the use of cyberspace, whereas, 'cyber-attack' refers to the operation that may involve 'change, destroy, deceive, degrade or disrupt networks or computer units transiting in or resident in these units or networks' (Russel 2014).

Communication infrastructure refers to a 'framework of interdependent networks and systems', generally interlinked at many different levels, including industries, institutions and distribution capabilities that provide a flow of products or services (Halpin et al. 2006). Critical infrastructures and key assets also include basic life fundamentals, i.e., water, public health, food, energy, banking and finance, emergency services, postal and shipping, defence, industrial manufacturing, telecommunications, transportation, chemical and hazardous material industry (Bush 2003).

The National Initiative for Cyber Security Careers and Studies (NICCS) defines 'cyber security' as:

**...the activity or process, ability or capability, or state whereby information and communications systems and the information contained therein are protected from and/or defended against damage, unauthorised use or modification, or exploitation.**

Emerging technologies such as 5G, AI, quantum computing and evolving technologies such as the IoT, autonomous vehicles and Cloud, all need cyber security since securing all these assets will play a pivotal role in the emerging global cyber warfare. The rising and profitable ransomware cyber-attacks, and the data privacy problems may impact the cyber environment in days to come.

Another important point is the shortage of cyber security experts and professionals and how digital life would change the way we live and interact. An example of this scenario is the lockdown due to the COVID-19 pandemic which resulted in moving from traditional modes of working hours and education to digital mediums across the globe.

## Implications of Cyber Warfare from Economic, Social, Political & Ethical Perspectives

Cyberspace is considered the 5th warfare domain other than conventional arenas of air, sea, land and space. It is best described as a new zone of conflict and will have significant impact from economic, social, political and ethical perspectives.

The economy of cyber security has turned out to be a fast-moving discipline and has attracted policymakers worldwide. Today, digital and knowledge-based economy has become a powerful source and major driver of economic growth of developed countries accounting for 8-10% of their GDP (NAO 2013). In this context, the future of knowledge-based economies will be determined by assurance of cyber security of any country's technology and other relevant infrastructure.

**The most important factor is that all activities undertaken in cyberspace (financial transactions, billing, online work, services, and retail) need to be protected.**

Securing economic activities and classified data in cyberspace is very sensitive. According to a report published by McAfee and the Centre for Strategic and International Studies (CSIC), cybercrimes have impacted economies worldwide and 1% of global GDP has been lost to cyber-related crimes each year, estimated around USD 445 billion (Lewis 2018). The report further stated that with the advent of new technologies, cyber criminals have adapted and can significantly leverage digital currencies and black markets to their maximum advantage.

After 2017, three major long-term trends in the financial cyber threat landscape across the globe surfaced. Cyber-attackers have increasingly built advanced capabilities to attack vital banking systems, particularly, transaction authorisation, and payment messaging. In 2011 and 2012, cyber-attackers targeted an American bank by using Distributed Denial-of-Service (DDoS) in order to disrupt banking services. Many years later in 2018, wiper malware was used across banking IT systems similar to setting a bank on fire as part of the 'getaway'. Cyber-attackers have kept on finding ways for collaboration, and bridging criminal activities across multiple platforms. Online marketplaces offer services and tools to facilitate money laundering and cashing-out. The law enforcement agencies face difficulties in pursuing cross-border platform crimes.

There are many financial institutions, irrespective of their size, which have experienced intrusion into their systems over the past many years. A study of 154 institutions in New York State found that cyber-attacks included the use of malicious malware (22%), botnets (7%), and phishing (21%). The bigger the organisation, the more likely it would have experienced phishing and malware attempts (Cuomo and Lawsky 2014). Furthermore, the most persistent cyber intrusion reported were identity theft (18%), accounts takeover (46%), data integrity breaches (9.3%), ATM skimming (23%), mobile phone exploitation (15%), and telecommunication network disruptions (15%) (Ibid.).

Throughout 2018, hackers kept penetrating fin-tech companies, banks, crypto-exchanges, ATMs, and point of sale (POS) terminals. The infection attempts were noted to have originated from Asia, Africa and Latin America. Crypto-exchanges and fin-tech companies are at higher risk due to immature security systems. Supply chain attacks were also noticed. It is worth mentioning that MageCart group was able to get vast amounts of payment cards data by infecting websites payment gateways, including British Airways. They targeted Magento – a popular platform for online stores, and found vulnerabilities in Magento and infected dozens of sites.

Another significant development seen during 2018 included six new malware families according to Kaspersky Lab specialists. Plotus malware emerged from Latin America and was updated to a new version Peralda. There was also a rise seen in nation state-sponsored attacks against financial organisations (Namestnikov 2019).

In 2019, cyberattacks through the use and theft of biometric data were also seen due to which financial institutions are gradually implementing biometric systems for user identification and authentication. Furthermore, cyber-criminal activities are constantly growing in the Indo-Pakistan region, South-East Asia and Central Europe due to the lack of maturity measures in place across these regions.

Social engineering is also popular in some regions, particularly in Latin America for targeting specific people and financial institutions. This type of cyber-attack is more

effective as it uses leaked internal information to make it look legitimate, e.g. attacks like 'simswap' (Namestnikov 2019). As far as cyber risks associated with financial institutions are concerned, most institutions claim that the greatest challenge for building an adequate cyber security mechanism emerges from external factors. Hence, the limited budget allocated for cyber programmes are by no means a justifiable approach which can combat cyber threats to the banking sector effectively.

Cyber security has also become a genuine issue for world politics seen as an instrument to gain domestic interests and objectives, based on various national and international approaches.

**On the one hand, many states consider emerging technologies as tools to shape adversaries' perception and control polls or public opinion; on the other hand, various countries use these to achieve their strategic agendas.**

For example, Donald Trump's 2016 election campaign harvested millions of US voters' Facebook profiles to develop a software programme to predict and control ballot box choices through Cambridge Analytica for political gains. If we accept Clausewitz' 1873 dictum that 'war is a political instrument and a continuation of political activity by other means', it means that cyberspace actors are those who tend to achieve political ends (Clausewitz 1873, p.88). The undefined boundaries of cyberspace further exacerbate the animosity of actors - whether an adversary or an ally. Allies when they are faced with a common threat, and adversaries when one of them tries to protect, defend and advance its own interest at the expense of others (Cornish et al. 2010).

**The importance of politics in a cyber environment cannot be underestimated. A time may come when states can assert and consider it their right to control virtual domains, which can lead to more war-like behaviour in cyberspace.**

The societal aspect of cyber warfare cannot be overlooked as there is always a risk of disruption of daily life, which can impact key services and governmental infrastructure and have far-reaching consequences on daily life. The most important dimension of cyberspace lies in ethical considerations. For instance, in midst of the recent outbreak of COVID-19, when majority businesses were closed worldwide, cyber criminals have been targeting medical facilities and hospitals such as the cyber-attack on a Czech Republic hospital (Porter 2020). The cyber-criminals tried to capitalise on the global health crisis and this opportunistic nature of cyber-attack proves that they have their own financial agendas. Such behaviour needs to be curtailed through stronger legislation and oversight by both state and non-state actors.

As new technologies emerge, more threats also surface such as machine learning cyber-attacks, ransomware, attacks through IoT, blockchain hacking, cryptojacking, AI-based hacking and data privacy breaches.

## Pakistan's Digital Threat Landscape

Pakistan, despite being a frontline state in the War on Terror and being at the forefront in eliminating extremism from the country, has focused little on cyberspace misuse.

**As a nuclear state, with its significantly important geopolitical position, the possibilities of cyber-attacks on critical infrastructure should not be taken lightly.**

During the past few decades, the capabilities of cyber-attackers and vulnerabilities of ICT infrastructure have grown manifold and transformed from low level opportunistic crimes to bigger and better planned/organised cyber-attacks on critical infrastructure.

The digital threat landscape of any nation depends upon the vulnerabilities of its ICT-reliant infrastructure. Pakistan's digital threat landscape is formed by the nation's dependability on cyberspace for governance and service delivery and is weak due to lack of cyber security preparedness and adverse sociopolitical environment both at domestic and regional level.

## Evolution of Cyber Security Landscape in Pakistan

Pakistan's dependence on ICT infrastructure has been growing over the last two decades, particularly e-government initiatives and e-commerce due to greater internet connectivity. As of June 2018, four billion people were using the Internet across the globe (55.1%) compared to only 16 million users (0.4%) in December 1995 (Internet World Stats n.d.). This requires responsible state decisions in securing virtual boundaries along with physical boundaries. This is also true for Pakistan which faces not only cyber threats due to its fast-growing e-commerce, e-government and e-business and its reliance on ICT infrastructure, but also regional conflict and terrorism.

As per 2019 statistics of the Pakistan Telecommunication Authority (PTA), more than 65 million people use the Internet across the country, accounting for 31% internet penetration rate (PTA n.d.). The Information Economy Report of the UN Conference on Trade and Development in 2017 reported Pakistan as the top ten growing internet economies globally (Ahmed 2017). The number of internet users in Pakistan increased by 11 million during 2019-20. This brought internet penetration to 35% in January 2020 (Kemp 2020).

In Pakistan, public and private organisations are using digital services similar to other developing countries. The National Database and Registration Authority (NADRA) keeps the classified information, identity documents database and shares online information with banks, immigration and passport departments, Election Commission of Pakistan, security departments and mobile operators.

There are a number of public organisations which have started offering e-services in social, security and economic domains in order to achieve modernisation and better efficiency. The government initiated a number of ICT-based initiatives, including internet banking, online stock exchange, Automatic Teller Machines (ATMs) and online payments. There are a few institutions such as hospitals, educational institutes, and the Khyber Pakhtunkhwa police department which have started delivering e-government services.

## *Banking Sector*

Pakistan has seen rapid changes in the banking sector over the past two decades. Since the establishment of State Bank of Pakistan in 1948, private sector was encouraged to set up commercial banks and financial institutions in the 1950s and 1960s till the mid of 1980s when the complete banking sector of Pakistan was nationalised (Ahmad 2010). It was Meezan Islamic Bank which opened its Islamic bank branch in Pakistan in 2002 followed by many banks in Bahrain, Saudi Arabia, United Arab Emirates (UAE) and the Philippines.

A major turnover came in the banking sector with the initiation of 1-LINK 'payment switch' technology that made it possible to connect 38 commercial and microfinance banks and inter/intra bank transaction in the country for the first time.

Almost two decades ago, with the advent of 1-LINK, the number of ATMs rose to more than 10,000 in ten years and the ATM transactions grew 16% - 300 million in the fiscal year 2015 (Mehdi 2015).

The advent of 5G technology has brought the next wave of a digitally connected society all over the world. Internet access to mobile phones has become fundamental to all businesses and other industries that are Cloud-based. Big data is allowing every individual to leverage the globally connected knowledge-based system. Presently, in Pakistan, operators have successfully set up 4G/LTE networks across the country and 5G technology is under review.

**The security issues linked with 5G technology are mainly due to advancements in AI, machine learning, data sciences, IoT, and robotics. Some known threats found in 5G technology include real-time tracking, surveillance and an ability to spoof emergency alerts triggering panic.**

Digital banking or alternative channels are considered to be core activities of a bank. There is no resistance [on the banks' part] now. The mindset today is more [towards] innovation and digitalisation than what it used to be in the past (Mehdi 2015). Branchless banking has grown rapidly and Easypaisa system offered by Telenor is one such example (Baloch 2014). Moreover, various e-banking services like 'E-Sahulat' and mobile banking provide banks an alternate option to more than 8000 BB agents (The Nation 2013). This way, commercial banks provide digital banking services, online transactions, ATM usage, online cellular phone recharging systems, international transactions, and online shopping (Ibid.).

In 2018, Pakistani banks suffered huge financial loss due to cyber-attacks, particularly at ATM systems, debit and credit card payment systems, SWIFT and IT systems. The Bank Islami Pakistan faced one of the most volatile cyber-attacks in October 2018 known as 'cash-out cyber-attack'. The cyber-attackers managed to use clients' debit cards to withdraw money from ATMs in many countries, notably from Russia. The bank admitted loss of USD 20,000. The literature suggests that attackers sold the debit card database on designated credit card Darknet market from where Russian hackers purchased, duplicated the cards and withdrew money. However, following the attack, Bank Islami stopped its international transactions (ClearSky 2019). This cyber-attack suggests that it was not executed by a group of hackers, rather it seems more like a lone hacker's activity who took advantage of compromised information.

The main challenge for Pakistani financial institutions remains the extensive use of IT applications associated with digital banking resulting in cyber security hazards, cyber-attacks on clients' profiles, frauds in data messages, accounts hijacking for financial transactions, and compromise of customer's privacy.

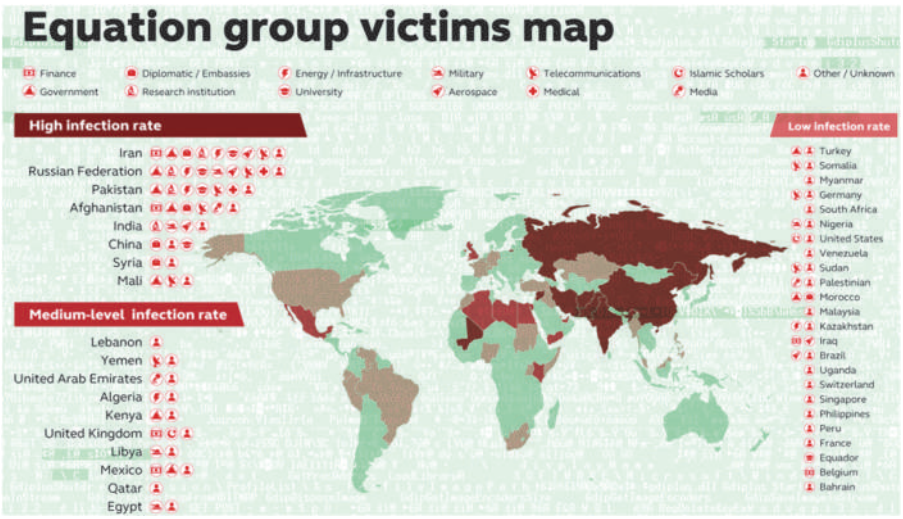
Another point of concern in Pakistan's financial institutions is the hiring of non-specialist employees and unprofessional training sessions. The banks prefer to hire people having banking or business background for the implementation of day-to-day operational tasks. Nevertheless, because of minimal understanding of IT and cyber security, the privacy of clients become compromised and attackers end up hacking the systems of non-technical personnel (Hussain et al. 2017). A survey found that Pakistani banks are in the process of executing various security measures onto their systems which can, in future, minimise cyber security threats. Banks are working on isolating the infected workstations from the main networks, installing security patches, upgrading the Operating System (OS) versions and executing deep scanning to find and remove infected items.

In Pakistan, banks are now seen to be investing more in their security. United Bank Ltd (UBL) is managing cyber security through a strong IT team and firewall systems. They have also established an anti-fraud unit in order to overcome cybercrime. The First Micro Finance Bank has a strong IT team, which looks after proper monitoring of transactions where possibility of cybercrime can occur. They also have a Fraud Management and Restriction Department in order to lower cybercrimes. Faysal Bank has, over a period of time, established a strong IT team which looks after cybercrime matters. They control cyber-attacks through firewalls and information secrecy systems. Bank-Al Habib, Askari Bank, and Meezan Bank have IT teams which take care of cybercrimes through proper monitoring. They also conduct awareness campaigns for staff and customers (Malik 2018).

## Cyber Threats to Pakistan

Pakistan's increasing reliance on cyberspace and lack of existing dependable cyber security systems create vulnerabilities for the country's critical infrastructure. According to the annual report of the Global Cybersecurity Index (GCI), Pakistan ranked 67th out of 193 countries on its commitment to cyber security (ITU 2017). The report further mentioned that this poor state is due to the country's inadequate technical, legal, organisational measures, capacity building and cooperation for the upgradation of cyber security. The naked state of Pakistan's critical infrastructure is evident from a few examples.

**Figure 1: Pakistan's Compromised Cyber Security Status**




*Source:* GISuser 2015.

Pakistan was ranked among the third most targeted country for espionage and surveillance by the Tailored Access Operations (TAO), the US National Security Agency (NSA) (Cassidy 2013). This came into the limelight after various governments' data was leaked by Edward Snowden in 2013. The Equation Group or the office of TAO which is now known as Computer Network Operations, is a cyber-warfare intelligence unit of the NSA tasked to identify, monitor, infiltrate, and collect intelligence on computers being used by foreign entities against the United States (Kingsbury 2009). The programme has been active since 1998 (Riley 2013).

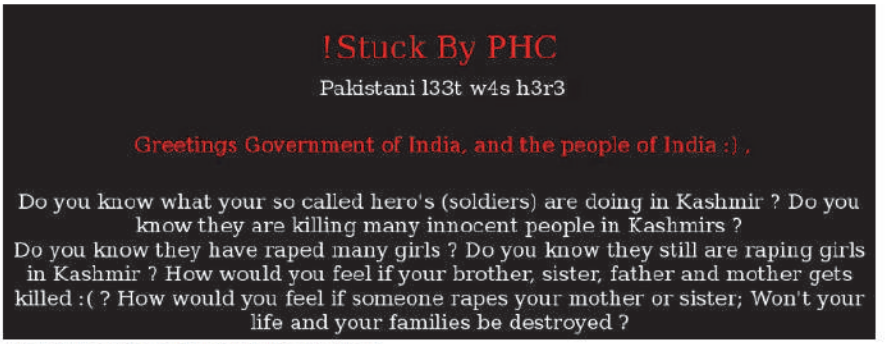
In 2015, Pakistan's Senate Committee on Foreign Affairs identified Pakistan amongst those nations which were on the top in foreign espionage (Rafiq 2017). Furthermore, Microsoft announced that in 2015, Pakistan had faced exorbitant number of malware attacks (Ibid.).

Cyber conflict between India and Pakistan has always been triggered by incidents on the conventional front. Both nations have been regional rivals since their independence in 1947, followed by the disputed Kashmir conflict, which continues to remain a sore point. Physical events lead to conflicts and penetration in cyberspace. The cyber actors of India and Pakistan also conduct cyber espionage against each other which adds fuel to the fire to an already tenuous situation.

In 2017, Pakistani hackers 'Pakistan Haxor Crew (PFC)' took the responsibility of hacking Indian universities' websites. The group announced the websites' defacement as a reactionary move after the Pakistan Railways website was hacked by Indians a day before (D'Mello 2017).

Cyberspace engagements of both countries are seen mostly on Independence Days or any physical events that lead to conflict in cyberspace. During 2017, Indian hackers defaced various Pakistani ministries' websites including Ministry of Water and Power, Ministry of Defence, Ministry of IT, Ministry of National Food Security and Research, Ministry of Law and Justice, and displayed Indian soldier and Indian flag (Ibid.) (Figures 2 & 3).

**Figure 2: Indian-hacked Pakistani Government Website**




*Source:* The Times of India 2017.

**Figure 3: Pakistani Hackers Hacked Indian Government Website**


*Source:* The Times of India 2017.

Later the same year, Indian hackers penetrated into the users of a software named Inpage in Pakistan (Jang Daily 2017). In February 2019, Indian hackers named *I-Crew*

hacked several Pakistani websites after the Pulwama attack. They hacked the websites and issued the list of hacked websites on social media.

Pakistan's cyber threat landscape has also witnessed terrorists' engagement in cyberspace. These terrorist organisations have their presence online and use cyberspace and social media for execution of terrorist activities. After the success of Operation *Zarb-e-Azb*, cyberspace has become a safe haven for extremist groups as their physical terrain has shrunk.

It was reported by Radio Mashaal (2019) that 37 banned extremist organisations out of 65 in Pakistan had online presence and were thriving on social media. The groups were found to be running more than 400 social media accounts for recruitment and propaganda.

Digital activists say that Pakistan's youth, which make up a majority of the country's 200 million population, are especially vulnerable (ITU 2016). The head of Digital Rights Foundation notes that:

> **Extremist groups are more tech-savvy than us. They use the internet very effectively for raising funds and radicalizing youth (Gandhara 2017).**

Radio Mashaal (2019) reported that Twitter and Facebook were the most favoured platforms of terrorist organisations, whereas YouTube, Internet Archive, JustPast.it and Daily Motion are commonly used social media platforms. The extremist groups use free service of end-to-end-encryption enabled messaging for distributing their content. In Pakistan, most terrorist organisations use social media for communication and promoting their content (Table 1).

As far as Government of Pakistan (GoP) is concerned, they are in the process of closing down the pages of extremist groups on the dark web. The Ministry of Interior blocked more than 45 websites and 65 Facebook pages, which were encouraging violence, misusing Islam and spreading sectarian hate (Gandhara 2017). A report issued by Facebook also revealed that the government had requested for the information of more than 1500 suspected accounts in 2018. However, militant groups are continuously growing their presence online. In January 2019, several activists and rights watchdogs criticised Pakistan's security agencies for arresting bloggers who were objecting to the military's policies as well.

The coordinator for the National Counterterrorism Authority Pakistan (NACTA) has emphasised the importance of having a cyber strategy which could counter terrorist's narrative (NACTA 2019). He was of the opinion that youth should be given an alternate narrative by exposing wrong interpretation of Islamic teachings rather than blocking the Internet.

**Table 1: List of Terrorist Organisations Operating against Pakistan Using Social Media**

| Organisations | Social Media Platforms | Total Accounts |
|---|---|---|
| Tehreek-e-Taliban Pakistan (TTP) | | 41 |
| Jamat-ul-Ahrar | | 39 |
| Abdullah Azaam Brigade | | 7 |
| Ahle Sunnat Wa Jamat | | 17 |
| Lashkar-e-Jhangvi | | 11 |
| Lashkar-e-Jhangvi (al-Alami) | | 12 |
| Jaish-e-Mohammad | | 7 |
| Jamaat-ul-Furqan | | 3 |
| Tehreek-e-Azadi Jammu-Kashmir | | 8 |
| Jaysh al-Islam | | 4 |
| Lashkar-e-Islam | | 3 |
| Ansar ul-Hussain | | 3 |
| Jamiat-ul-Ansar | | 5 |
| Hizb-ut-Tahrir | | 8 |
| 313 Brigade | | 2 |
| Anjuman Imamia (Gilgit-Baltistan) | | 5 |
| Ansar-ul-Islam | | 4 |

| | | |
|---|---|---|
| Tehrik-e-Islami |  | 3 |
| Tanzeem Jawanan Ahl-e-Sunnat |  | 4 |
| al-Qaeda |  | 11 |
| East Turkestan Islamic Movement |  | 12 |
| Islamic State |  | 22 |
| Sipah-e-Muhammad |  | 4 |
| Tehrik-e-Taliban (Swat) |  | 6 |
| Tehrik-e-Taliban (Momand) |  | 13 |
| Jamaat-ud-Dawa (JuD) |  | 48 |
| Balochistan Liberation Front |  | 16 |
| Balochistan Liberation Army |  | 11 |
| United Baloch Army |  | 7 |
| Baluch Students Organization (Azad) |  | 12 |
| Baloch Republican Party (Azad) |  | 7 |
| Balochistan Republican Army |  | 5 |
| Balochistan Liberation United Front |  | 4 |
| Jeay Sindh Muttahida Mahaz |  | 4 |

*Source:* Gandhara 2017.

## Pakistan's Existing Preparedness

Pakistan does have cyber laws and policies at the national level, but the problem lies in implementation. The annual report issued by McAfee (2017) stated that more than 120 countries were expanding cyber capabilities in offensive domain, including manipulation, degradation, blockage, or destruction of information and computer networks. The notable countries in the list are Russia, China, Israel, North Korea, India, Iran and the US.

**The cyber offensive policy had the lion's share of India's military doctrines. The 'Cold Start Doctrine' also identified seven forms of information warfare, including cyber warfare. Furthermore, the Joint Doctrine of Indian Armed Forces issued in 2017 stressed the significance of cyberspace operations in coordination with military operations (Hali 2017).**

During the last few years, India has been engaged in signing bilateral agreements with various nations regionally and globally to improve cyber security. This becomes a serious threat for Pakistan when the bilateral agreements are within the prism of India-Israel cyber security cooperation. One of the most important pacts in this regard is the Israeli Talpiot training programme which aims at upgrading the Indian cyber security architecture (Srikumar 2017).

It is also important to mention the implications of 4th and 5th Generation Warfare which deal with the battle of information and perceptions. It is a cultural and moral war which manipulates the perception of general masses by providing and highlighting a planted view of the world and politics. Both of these wars differ on the basis of using technology to disrupt economies and developing military might to gain control of natural resources and achieve their political motives.

**It is vital for Pakistan to understand the dynamics of these virtual hybrid war tactics in order to better defend itself from misinformation, propaganda warfare, unlawful intervention and media exploitation.**

Given below are a few important initiatives taken by the GoP:

### *Electronic Transactions Ordinance, 2002*

Pakistan initiated the first step to regulate cyberspace with the initiation of the Electronic Transactions Ordinance in 2002 (Blythe 2006). The purpose of this Ordinance was to find and aid communication, documentation, electronic records, transactions and information. It was also considered the classic decision for the

burgeoning IT field with an aim to have an economic impact on the country as well. With this Ordinance, Pakistan was placed with other various nations, which have legal backing for electronic information or communication. It also gave birth to the e-commerce industry and became a stepping stone towards the development of IT in the country (Mohiuddin 2006).

## *The Electronic Crimes Act, 2004*

In 2004, the Ministry of Information Technology and Telecommunications prepared the Electronic Crimes Act based on the Electronic Transactions Ordinance, 2002 (Ibid.). The Act postulated laws encompassing cyber stalking, criminal data access, electronic fraud, data damage, electronic forgery, malicious coding, spamming, spoofing, cyber war, cyber terrorism, abetting and punishment for digital crimes.

## *Prevention of Electronic Crimes Ordinance, 2007*

The Prevention of Electronic Crimes Ordinance (PECO) and National Response Centre for Cyber Crime (NR3C) were established in 2007 (Tariq 2013). By the end of 2007, PTA blocked 1,000 websites related to adult content. In 2012, PTA further blocked more than 60,000 websites of pornography and blasphemous content (Abbasi 2015). The NACTA report published in April 2019 also revealed that despite blocking more than nine million SIM cards, more than 3,000 websites and 1,000 social media sites, a few attempts were unsuccessful in curbing extremism in the country (NACTA 2019).

## *Seven Points Action Plan*

In 2013, after the leakage of Snowden's reports, Chairman of Senate Committee on Defence and Defence Production introduced the Seven Points Action Plan. The Action Plan was formulated for defending the country's critical infrastructure and secure cyber vulnerabilities posed to the country. It entailed developing Pakistan's cyber security framework at the national level.

## *National Action Plan (NAP)*

The GoP announced the 20-point National Action Plan on 24 December 2014 in order to curb terrorist activities in the country. Out of 20 points, only one deals with online radicalisation and social media hate speech - point 14 calls for measures against abuse of the Internet and social media for terrorism. The NAP agenda lacked proper directions as there remained no coordination between provincial and federal governments and it also lacked military backing. After four years, NACTA (2019)

reported failure to curb terrorism despite blocking more than 30,000 SIM cards and thousands of websites.

### *Pakistan Electronic Cybercrime Bill, 2016*

This Bill consists of laws associated with electronic forgery, cyber terrorism, identity crimes, unauthorised interception, illegal interference with information systems, along with special protection for women. It also deals with privacy safeguards for citizens of the country. However, the Bill received severe criticism from human rights NGOs for obstructing freedom of speech, providing extra powers to law enforcement agencies of the country and curbing basic human rights of common citizens (Khan 2016).

### *National Centre for Cyber Security (NCCS)*

The National Centre for Cyber Security was set up in 2018 aiming to become a Centre for scientific research and innovation in latest tools and technologies to safeguard the country's cyberspace. The Centre is housed at the Air University having its affiliated labs at many other universities across the country. However, since its establishment, the Centre has not provided any output in tangible terms.

## Conclusion and Policy Recommendations

Keeping in view the existing cyber threat landscape, Pakistan needs to step up its efforts and work in collaboration with other countries at the policy, federal, educational, military, provincial and strategic level in order to first develop a cyber security structure that can withstand and defend against any cyber-attack.

**Examples from other countries indicate that a reactionary approach does not work in case of cyberspace. The Government of Pakistan needs to take a highly proactive approach.**

With 50 billion devices connected by 2030, Pakistan will have cope with the challenges of cyber security in a highly connected world through proper cyber legislation, cyber security structures country-wide, establishment of CERTs at federal and provincial levels, and most importantly, setting up a strong cyber posture of the country. In order for Pakistan to be in the top ten countries with the highest commitment to cyber security based on the Global Cybersecurity Index (GCI), following step-wise measures are required:

## *Legal Measures*

### *National Cyber Security Policy*

The government should work on a cyber governance framework under a National Cyber Security Policy. The policy needs to encompass laws related to cybercrimes, cyber warfare, cyber terrorism, cyber pornography, data privacy, espionage and unauthorised use of official data etc. The policy should discuss the various institutional structures for implementation at the national level including labs for CERT, security evaluation, crypto security, forensic and IT security, information sharing and communication, and IT security audits.

## *Technical Measures*

### *Pakistan Computer Emergency Response Team (PAK-CERT)*

Establishment of PAK-CERT is a long awaited decision to be made by the GoP. India set up its CERT-IND in 2004 considering the emerging cyber threats to the country. However, Pakistan still lacks the requisite institution, thus, remains vulnerable to sophisticated cyber-attacks to its critical infrastructure. The Government should establish networks of CERTs across the country - a central set-up at federal level, and provincial CERTs. The Federal CERT may act as central command, responsible for identifying, detecting, halting and responding to cyber incidents effectively at the national level. It should also establish joint response structures within the country at provincial CERTs in each province.

## *Organisational Measures*

### *Establishment of Tri-service Cyber Command*

The existing cyber security efforts being carried out are fragmented and scattered in nature, which need to be consolidated and established at a unified national level Cyber Command having tri-service officers. The purpose of this Command would be to conduct and synchronise various activities and defend the nation's cyberspace. It should be capable of attaining freedom of action in cyberspace, while denying the same to adversaries. The Cyber Command should be fully functional and be able to conduct full spectrum cyberspace operations if the country faces any foreign threat to its strategic and national interest.

## *Capacity Building Measures*

### *Centre for Cyber Excellence*

The government should set up a 'Centre for Cyber Excellence' which can focus on multidisciplinary research related to cyber technologies. The Centre could focus on bringing out the best scientific knowledge to the industry and generate a pool of cyber researchers.

### *Cyber Workforce*

All universities under the umbrella of the Higher Education Commission (HEC) should offer cyber security professional degrees or offer courses as part of the curriculum like the Cyber Security undergrad degree offered by Air University. The universities can further join hands with PAK-CERT and Cyber Command for their HR requirements. The pool of cyber experts should be able to secure jobs as soon as they complete their degrees.

### *Capacity Building*

The government should take various measures for the capacity building of Law Enforcement Agencies (LEAs) in the realm of cyberspace. As the government relies more on digital devices, the LEA operators and workers should be trained and equipped equally to combat cybercrimes.

### *Cyber Campaigns*

General public awareness should be made in the form of advertisements to promote digital rights and data privacy rules. The government, in collaboration with the HEC and education institutions, could commemorate 'Cyber Day' once a year for awareness. There should be various seminars and awareness campaigns for youth and common citizens on how to use the Internet. Special training programmes for cyber readiness should be conducted. Early years programmes in ICT for children should be developed and implemented.

## *International Cooperation*

### *Pakistan's Stance on International Cyber Norms Building & Bilateral Agreements with Like-Minded Countries*

Countries all over the world have realised growing cyber threats and came together to discuss their modalities and solutions. This led to the creation of the Group of Government Experts (GGE) under the ambit of the United Nations. These expert groups have had several international meetings till 2019. However, the meetings have remained unsuccessful due to various interests of each country. India is an active part of the GGE. Presently, India and China have jointly prepared a draft and submitted it to the UN GGE for perusal. Pakistan should also work on cyber norms building and come up with a strong stance which can firstly cater to its national interest and also join hands with like-minded friendly nations for collective security in cyberspace. Pakistan can also use the platform of the Shanghai Cooperation Organization (SCO) to formulate regional cyber security strategies.

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# Innovative Sector-specific Digital Solutions for Achieving the SDGs

## Renewable Energy Reforms in Pakistan: An Appraisal

## Role of Agriculture Sector in Attaining the Sustainable Development Goals

Perspective / Argument Essay

# Renewable Energy Reforms in Pakistan: An Appraisal

*Asad Afridi*
Researcher,
Independent Power Producers Association,
Islamabad, Pakistan

*Dr Fatima Khushnud*
Chief Executive Officer,
Independent Power Producers Association,
Islamabad, Pakistan

**Abstract**

In an era of the lowest investment in Pakistan's history, the launch of a Renewable Energy Policy Framework is one of the few fleeting opportunities for the country to attract investment. The reason why policies trump political slogans - in attracting investment - is because they ensure sanctity of contract, enabling environment, and consistency of government action. Keeping this in mind, one can judge the current Policy Framework for promoting the growth and development of Renewable Energy (RE) in Pakistan.

The Alternative and Renewable Energy Policy 2019 (ARE Policy 2019) is expected to be a principal part of the REPF. The policy aims to ensure RE growth by promoting competitive tariffs, efficient and rational decision-making and inclusiveness. Though the policy does its job of becoming a path-breaking document that may pique investor interest, it has room for improvement. That improvement can be divided into amelioration of past mistakes (such as promoting demand creation and creating provision for conversion of Residual Fuel Oil), and accommodation of future needs (e.g. revamping the structure of the transmission and distribution sector and adapting it for the Fourth Industrial Revolution).

## Introduction

The world, along with Pakistan, is entering the age of renewables. It is up to the policymakers to decide whether the country repeats history by stumbling through this age or marks a new epoch by pre-empting new market dynamics with prudent policies. Before discussing policy dynamics, it is important to revisit the 'reason-for-being' of policies. Policies are created to ensure sanctity of contract, consistency of government action and an enabling environment. Keeping these objectives in mind, one can judge recent policy measures for promoting the use of renewable energy. Chief among these measures is the Alternative and Renewable Energy Policy 2019 (ARE Policy 2019). The policy has introduced a number of novel measures designed to make Pakistan a regional leader in employing renewable energy to meet its energy mix demands.

**To that end, the ARE Policy 2019 uses three types of tools namely: measures of reducing average generation tariff, efficient and rational decision-making, and inclusiveness.**

Nonetheless, like every policy framework, it also has room for improvement. Such improvements can be bifurcated into features that are designed to either correct past mistakes or adapt to the future. Caveats that correct past mistakes include:

- facilities for conversion of RFO units to coal,
- incentives that promote utilisation of domestic resources,
- stimulus for local demand creation, and,
- development of an energy market.

In comparison, the action plan for adapting to the needs of the future consist of:

- revamping of transmission and distribution to meet the high variability of renewable energy,
- solving the issues of capacity markets, and,
- laying the foundation of a structure that would support the Fourth Industrial Revolution.

## The 'Why' of Policies

According to Simon Senk, delving into the why of any endeavour increases the odds of success and power policymaking is no different. After the early 1990s, the world saw a move towards privatisation of power production, transmission, trading, distribution and storage.

**Policies are created to ensure that the private sector has the three basic requirements needed for it to succeed. They are sanctity of contract, enabling environment and consistency of government actions.**

**Sanctity of contract** entails delivering on the promised contractual obligation to the power producers. This fulfilment of contract is institutional rather than populist in nature. Such fulfilment of promises creates the stability that is required to promote new investment and make a rationale for retaining earned profits in the form of investment.

Similarly, an **enabling environment** requires the government to have a non-confrontational tone with the private producer. This leads to a favourable business environment that is capable of promoting value addition and innovation. Policies can guarantee such an environment through their facilitation. Of course, such facilitation only counts if such an environment is consistently provided.

**Consistency of government action** translates into creating a predictable business environment long after the honeymoon period of a policy has ended. Due to the nature of the power sector, an investor has to invest into a facility over a long time (30 years+). During such time, the government may see a change in leadership. As a hedge against the ebb and flow of politics, a businessperson needs consistent response from the national institutions in order to realise his/her expected returns and make decisions about further investments.

## Policymaking - An Appraisal of ARE Policy (AREP) 2019

The global Gross Domestic Product (GDP) is expected to change its centre from the West towards the East. Therefore, Pakistan needs to ensure that it is ready to exploit that change. Creating a competitive, harmonious and secure power sector will be an important part of these preparations. Investments in power sector are guided by power policies. Though the ultimate policy framework of the country is guided by the Integrated Energy Plan, the intellectual gait of such future policies can be gleaned by looking at the salient features of the ARE Policy 2019, understanding the opportunities and making recommendations in light of current challenges.

### *Features of AREP 2019*

Before one can study the benefits of any alternative, renewable energy policy, it is important to understand the key features of Pakistan's AREP 2019. For starters, the Policy is a successor to Pakistan's first renewable policy called the 'Policy for Development of Renewable Energy for Power Generation, 2006' (AEDB 2006) which expired in March 2018. The new policy was created by the Ministry of Energy (MoE) (Power Division), but it took input from various stakeholders, both private and

government. As a result, the policy has pioneered a proactive basis of power induction. Under this approach, the private sector will take heed of a strategic goal set by the government rather than the government being dependent on the whims of the private sector. Such guidance holds true for both on-grid and off-grid power. This policy holds true for private as well as public DISCOS[1], and therefore, will remain adaptable to privatisation of DISCOS.

The bifurcation of renewable technologies into proven and 'alternative' technologies shows that it was written with the private sector in mind.

**Proven technologies, with a low risk premium, include solar, wind, geothermal and biomass; while alternatives include biogas, syngas, waste to energy, energy storage systems, ocean/tidal waves. The policy also makes allotments for hybrids.**

It would also be subservient to the Integrated Energy Plan (IEP) and guided by the Integrated Generation Capacity Expansion Plan. New Power Generation may be installed in the form of competitive bidding, Government-to-Government (G2G) or unsolicited bids. Most of the induction in power is expected to be placed under competitive bidding, while unsolicited bids would be reserved for new technology. Both federal and provincial governments may become part of the competitive bidding process. In addition, projects would also take the form of captive power, Business-to-Business (B2B) and off-grid projects. In addition, bidding nature of the projects would force the private party to locate the project close to the grid and take necessary precautions to ensure its stability. Bids would either be launched to displace old uncompetitive bids or to induct new capacity into the system. The AREP 2019 introduces auto indexation for relevant variables. Furthermore, it also includes carbon credits under its ambit.

## *Opportunities in AREP 2019*

The second draft of AREP 2019 revealed a number of important opportunities for improving the power sector's willingness to be a facilitator (AEDB 2019). The policy aims to make the sector more efficient, inclusive, rational and competitive. The conditions within the AREP 2019 in order to achieve aforementioned goals include a number of measures:

[1] Distribution Companies.

## *Competitive-Tariff: Four-sided Attack*

Currently, the sector has crossed the milestone of ensuring power availability and breaking free from the long spells of load-shedding. Now, the focus has been shifting towards making that **power more affordable**. ARE Policy 2019 is playing its part through integrating caveats into its framework that will ultimately result in lower generation.

**At the very onset, capacity bidding would replace upfront and cost-plus models.[2] Such a policy would level the playing field for all the players, while at the same time, reward producers that cut down on costs.**

In the long-run, capacity bidding would lead to competitive tariffs due to lower Engineering Procurement Construction (EPC) and non-EPC costs. Second, these capacity bids could either be placed to fulfil demand or to displace inefficient technology. These displacement bids would be capacity bids meant to displace expensive power plants. Such a clause would ensure that the sector would not delay integrating cost-competitive technologies into the national grid. The clause has been elaborated as follows: 'Major directional change from the past, as envisioned in this ARE Policy 2019, is that rather than adding ARE projects just based on capacity needs, such projects shall also be solicited for displacement of more expensive fossil energy as long as they are cheaper' (AEDB 2019, p. 5).

**Moreover, over the life-cycle of a given project, the power purchaser[3] will only off-take power on 'take or pay' terms till maturity of debt. Afterwards, the projects will shift to 'take and pay' basis. This visionary clause will reduce the overall price in many ways.**

For starters, with the introduction of 'take and pay', non-Energy Purchase Price (EPP) payments burden of capacity payments on the overall tariff may decrease even more. Then, tenor-related clauses would promote generation companies to seek long-term financing. Lastly, the government has taken active steps to reduce transmission-related costs for power projects. Location for new bids would be placed at the discretion of the transmission operator - location on the basis of maximum grid utilisation. Previously, proposals by sponsors had to be followed by the relevant transmission body[4] regardless of the cost of the new transmission line.

[2] This condition holds true for private parties. G2G contracts would have their own clauses.
[3] Central Power Purchasing Agency - Guarantee (CPPA-G).
[4] NTDC in the past, but in the future, it can be a provincial body.

**Under the new policy, the transmission body would be part of the committee that decides issuing of new bids. Such a policy will ensure reduction of overall generation cost by increasing transmission network utilisation.**

### *Efficient and Rational Decision-making*

In order to reduce the cost of doing business, for both regulators as well as generators, AREP 2019 has introduced auto-indexation. Furthermore, the bidding will take guidance from the NEPRA-approved Integrated Generation Capacity Expansion Plan (IGCEP) (NEPRA 2018). This would reduce the probability of issuing ad-hoc bids that do not gel with the planned energy-mix. Moreover, the policy places restriction on bid issuers to complete their work for the upcoming year by completing their preparation by 30th of every year. This would ensure that the sector does not suffer from lethargy on part of any one stakeholder.

**AREP 2019 has created targets for generation. It has a target set at off-taking 20% of Pakistan's electricity-mix from renewable sources by 2025 (30% by 2030). Such targets allow a policy to be judged on its success and failure.**

### *Inclusiveness*

**ARE Policy 2019 is highly inclusive when it comes to varied stakeholder opinion, potential for new technologies, value chain integration and approaches to generation business.**

Inclusion of stakeholders is ensured through the composition of steering committees. Steering-Committees are bodies that will be responsible for issuing new bids. These Committees will be composed of members from diverse bodies such as power purchaser (CPPA-G[5]), transmission bodies (NTDC[6]) and officials from the Ministry of Energy, Power Division. Diverse views from these stakeholders are expected to ensure lesser friction within projects during the implementation stage.

The AREP 2019 is also open to the use of new technologies in the form of unsolicited bids. Furthermore, it allows for new approaches in the use of facilities for value generation. These include hybridisation for better use of existing infrastructure and industrial scale batteries to address the dip in demand for power. Finally, the new Policy has been perceptive to the long-term development of the sector in terms of value chain integration. This is done via creating incentives for domestic manufacturing of

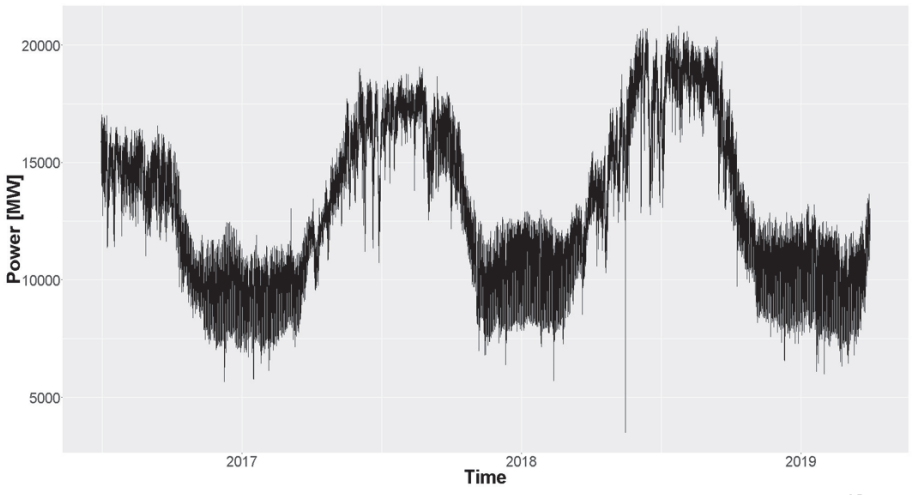
[5] Central Power Purchasing Agency-Guarantee.
[6] National Transmission & Despatch Company.

components used in generation facilities. However, even with all the opportunities, implementation of the AREP 2019 is expected to face a number of challenges emanating from unaddressed issues that are present in the power sector.

## *Challenges in the Policy*

The most obvious challenge to the implementation of AREP 2019 is the absence of an IEP or even National Electric Policy (NEP). Second, with already hefty additions to the grid's ability to generate power, no new additions have been made to increase the baseline power demand. This lack of growth in baseline demand can be observed in Figure 1:

**Figure 1: Lack of Growth in Baseline Demand**




*Source:* LUMS Energy Institute 2020.

Furthermore, the presence of circular debt creates an additional cash flow risk on the investment proposal presented to the financiers. The policy also has to be implemented in a market environment underwritten by the implementation of the Competitive Trading Bilateral Contract Market (CTBCM). Under a decentralised market, the policy would also have to deal with the issue of the capacity market. Such issues can be ameliorated through a number of policy changes.

## Policy Recommendations

Though ARE Policy 2019 is far-sighted, it is only one component of a much bigger policy framework. Therefore, such a policy can only succeed in an environment where the rest of the framework succeeds in achieving its targets. Such a framework includes: NEP, IEP and any New Provincial Power Policies. Such a power policy framework would have to learn lessons from the past and prepare for the future order to fulfil the duty entrusted to it by the nation.

### *Lessons from the Past*

Lessons from the past include outcomes that should have been secured by now, but have not been achieved either due to lack of foresight or inadequacy of implementation.

**In order to make amends, a new power policy framework needs to allow conversion of power plants, offer higher Internal Rate of Return (IRR) to domestic fuel projects, support demand creation and pave the way for creation of a liberal energy market. The most executable of these suggestions is creation of a facility for conversion of old power plants to a changed fuel mix.**

#### *RFO-to-Coal Conversion of New Power Plants*

As explained in the section above, the government is intent on reducing the capital expenditure requirements per MW of power generation. This includes reduction in transmission needs of the country. However, limiting such measures to new generation facilities would betray a lack of perspective. RFO-coal conversion of old power plants is one way of simultaneously increasing generation capacity, while at the same time increasing capacity utilisation. During the conversion, such power plants can be converted into hybrid facilities with options for renewable energy generation. Such a move can be beneficial for the old IPPs, improving their position on the merit order.

Meanwhile, the nation will benefit with an additional cheaper choice to adapt to the Integrated Energy Plan. Such a move could be executed by retaining the old Power Purchase Agreements (PPAs) and Implementation Agreements (IAs), or they could be done by treating the plants as new bodies. With such a facility, the policy framework would follow the prudence of using what is available within the energy mix before moving onto adding new sources of power generation.

### *Utilisation of Indigenous Resources*

In a similar vein, the government also needs to double down on promoting the use of indigenous fuel. This can be done by generating investor alacrity underpinned by higher IRR differential on domestic resource-based electricity generation. Sceptics of such a proposal need to take into account that domestic fuel-based resources not only have lower fuel cost, they also reduce depreciation pressure on the domestic currency. Domestic resource utilisation in energy mix is a proactive measure of alleviating inflation pressure associated with currency depreciation.

### *Demand Creation*

Demand creation is another proactive measure to reduce the ultimate cost of power generation in a sustainable way. A higher relative demand growth would help attract regional and international investment.

**One way of increasing demand for electricity would be to reduce the burden of indirect taxation on the price structure.**

Lower prices of electricity may encourage industrial consumers to move away from captive power, and hence, reduce barriers to entry for investing in manufacturing units. Such demand creation would ultimately result in lower capacity-payment-adjusted price of electricity.

### *Implementation of an Energy Market*

Another way to reduce the cost of electricity would be by ensuring timely implementation of energy markets. Unfortunately, this is not the first time that the power policy debate in Pakistan has focused on the creation of a dynamic energy market. The results have rarely matched the lofty aims. Currently, the country still has a single buyer of electricity: CPPA-G. The upcoming framework needs to create a deadline in order to sow the seeds of a dynamic market in the country.

NEPRA approval of the Competitive Trading Bilateral Contract Market (CTBCM) has been a welcome step in that direction. One potential implementation opportunity lies in the creation of Special Economic Zones (SEZs) outlined in the second phase of the China-Pakistan Economic Corridor (CPEC). The market can test independent contract generation for power supply to SEZs. Learning from such a limited experience could be used to set the basis for a proper energy market.

If the policy framework is able to integrate these lessons into its structure, it would fulfil its basic aim of not repeating past mistakes. However, the real merit of the policy structure would be judged on its ability to prepare the sector for the needs of the future.

## *Adapting to the Future*

**Future demands of the power sector include inter-alia: the need to revamp transmission and distribution system, intellectually address the issues of capacity payments, and, prepare the market for the Fourth Industrial Revolution.**

### *Revamping Transmission and Distribution*

The transmission and distribution sector of Pakistan has been placed at the bottom of the policy reform priority list. This paucity of attention has come to haunt the sector in the form of system-wide transmission constraints. Recent emergency efforts, on part of the NTDC, have limited these constraints to the local level such as evacuation constraint at Jhimpir. Nonetheless, the system still needs quantitative and qualitative investment. Quantitatively, the system needs to ensure that the new additions to the transmission network will be in line with the exponential growth in generation envisaged by the Indicative Generation Capacity Expansion Plan (IGCEP 2018-40) (NTDC 2018).

IGCEP 2018-40 is a document prepared by the NTDC that shows the future fuel mix and overall requirements of the system. The document aims to reverse the change in fuel mix that occurred in the early '90s. Expensive fuel mix would be replaced by hydel, wind and solar on the renewables side, and gas on the non-renewables side.

Quantitative changes in transmission and distribution would require more novel approaches. For starters, the sector would have to prepare to implement mesh networking required for complete implementation of mini-grids (Kazem and Sayyad 2018). Second, since the transmission system is being 'provincialised' via the creation of provincial transmission and dispatch companies. The policy needs to outline the creation of a mechanism through which these transmission and dispatch companies will communicate and transact with each other. Furthermore, the policy framework also needs to provide the groundwork for enabling point-of-contact transmission charges rather than fixed wheeling charges (Soone et al. 2012). Lastly, the transmission standards required to transmit energy from variable renewable energy and storage technologies is different from those of traditional non-renewable and non-variable renewable energy resources. With such preparations, the policy framework could move towards solving the issue of capacity markets before implementation of electricity markets.

## *Solving the Issue of Capacity Markets*

Pakistan's power sector has been aping the West in implementing an electricity market on the basis of two assumptions: First, electricity markets reduce the average tariff. Second, electricity markets remove the need for capacity payments. Unfortunately, more than a decade after implementation, it seems that electricity markets might be rescinding on their promise of not needing capacity payments. Currently, capacity payments are being provided to the generators on both sides of the Atlantic in the form of capacity markets. Such capacity markets are being justified on the basis of solving the 'missing money problem.'[7]

**The policy framework would either have to come up with a solution to the capacity market conundrum or adjust stakeholder expectations about electricity markets.**

## *Fourth Industrial Revolution*

In addition to the adaptations prescribed under transmission and distribution revamp, the Fourth Industrial Revolution would see the electricity sector being Decentralised, Digitised and Decarbonised (3Ds). Each of these dimensions would require separate preparations:

1. **Decentralisation** would require regulation and service provision of mini-grids.
2. **Digitalisation** would need creation of mechanisms to maximise utilisation of Internet of Things (IoT). Implementation of IoT, in turn, would require decisions on ownership of data and standardisation of equipment.
3. Effective and sustainable **Decarbonisation** would require efforts to mitigate the intermittency issues with variable renewable energy.

With the successful implementation of efforts to tackle these 3Ds, the policy framework may enable the power sector to embrace the Fourth Industrial Revolution in service of Pakistan. Such preparation, if executed, would have a number of potential benefits, all of which may be categorised under the Sustainable Development Goals (SDGs). For starters, digitalisation and decentralisation will ensure SDG3 (health and well-being by lowering environmental pollution). Needless to say a decarbonised system would help achieve SDG7 pertaining to provision of affordable and clean energy. Apart from helping with clean and affordable energy, decarbonisation would also help fight climate change (SDG13). Decentralised and digitalised cities are more sustainable (SDG11) and help ensure responsible consumption and production (SDG12).

[7] Investors are not realising the required Return on Equity (ROE) to make reinvesting in the generation market profitable enough.

## Conclusion

**The deployment of renewable energy in Pakistan has been bolstered by the Alternative and Renewable Energy Policy 2019. In order to take full advantage of this policy, the power sector needs to take a number of pre-emptive actions.**

The most important of these would be the creation and implementation of an Integrated Energy Plan (IEP). Afterwards, there would be a need for creating a National Electric Policy (NEP) that takes guidance from the IEP. The IEP should outline the interaction of renewable energy with other forms of energy - such as LNG - within the country. The NEP should harmonise the IEP with the power policies of the country. It would also help provide guidance for the implementation of AREP 2019 for the various federal and regulatory bodies within the power sector. Once IEP and NEP provide appropriate strategic guidance to the sector, further steps would need to be taken to facilitate execution of this strategy.

Alleviating transmission constraints and creation of demand would aid significantly in terms of facilitating this strategy. Removing transmission constraints is likely to ensure that growth in renewable generation is not constrained by transmission bottlenecks. Creating an inviting policy for RFO to coal conversion and utilisation of indigenous resources would do a lot to bring down the cost of energy. A cheaper electricity mix is likely to invite customers towards the power sector, and hence, indirectly support the implementation of renewable energy in the country. However, the government alone cannot execute such a plan. Private, regional and international players would have to play their part.

**For starters, the private sector can play a more active role in laying new transmission lines. In addition to improving transmission, private players can indirectly increase demand by taking part in the development of SEZs.**

Regional players such as the South Asian Association for Regional Cooperation, (SAARC) could help by creating a regional power grid and sharing technical knowhow. Renewable energy generation is heavily dependent on local weather conditions. Regional countries, in this regard, could aid each other by sharing knowledge about dealing with shared weather systems.

**Renewable energy tends to suffer from variability. One way of hedging this variability has been to rely on regional networks as in the case of Europe. Regional forums, like SAARC, could provide the opportunity for planning and standardisation efforts required for the creation of such grids.**

Furthermore, international partners such as the International Monetary Fund (IMF) and Asian Development Bank (ADB) could play their role by ensuring that the Government of Pakistan sticks to its conditionalities such as executing the circular debt reduction strategy and other such indicative targets, structural benchmarks and performance criteria. The ADB could help with technical and financial assistance in revamping the distribution sector in terms of soft skills as well as technology adoption.

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Working Paper

# Role of Agriculture Sector in Attaining the Sustainable Development Goals

*Dr Usman Mustafa*
Senior Consultant,
Pakhtunkhwa Economic Policy Research Institute,
AWK University,
Mardan, Pakistan

**Abstract**

Planet earth is facing multiple, multiphase, complex challenges. In order to address these challenges, world leaders adopted the Millennium Development Goals (MDGs) in 2000. There was significant progress on the MDGs, which inspired nations to think more broadly, comprehensively, and collectively. Subsequently, in 2015, these were refined and all member states of the United Nations adopted the Sustainable Development Goals (SDGs) - a transformation agenda - to act collectively in surmounting the MDGs shortcomings and transforming the planet for future generations.

This chapter identifies the role of the agriculture sector in attaining the SDGs and proposes measures to strengthen effectiveness of the sector in Pakistan. Relevant literature was reviewed and collected to support agriculture under each SDG. Significant role of agriculture was found in 10 out of 17 Goals. Achieving the SDGs would not be possible without resilient, robust, and sustainable agricultural sector development. There is a need to strengthen farming in developing countries by supporting growers, increasing investments in research, technology and market infrastructure and extending knowledge sharing.

## Introduction

The Earth is a beautiful planet. Unfortunately, human beings have been unable to sustain its natural resources due to which the world is facing manifold and multifarious challenges in the 21st Century. Realising this, the United Nations Millennium Development Goals (UN MDGs)[1] were signed in September 2000 with the commitment of world leaders to fight poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women. There was significant progress on the MDGs which inspired nations to think more broadly, comprehensively, and collectively. Subsequently, the 193 member states of the UN adopted the Sustainable Development Goals (SDGs) on 25 September 2015.[2] A set of 17 ambitious objectives with 169 targets were set, which were expected to guide actions of all states, governments, international agencies, civil society and other organisations over a period of 15 years from 2016-30. According to FAO (2016):

> **The SDGs are the first Member State-led global development push in history, laying out specific objectives for countries to meet by a given timeframe with achievements monitored periodically to measure progress.**

This is an ambitious 2030 Agenda with a global vision for people, for the Earth and for long-term sustainable prosperity. It pledges the international community to act collectively to transform the world for future generations. According to the UN (2020), the SDGs are the 'blueprint to achieve a better and more sustainable future for all.' They chart a plan for the future - shifting the world onto a sustainable and resilient course leading to transformation. They are for the people and planet (Griggs et al. 2013 and One Tree Planted 2020). The main focus of the SDGs is on 5Ps: People, Planet, Prosperity, Peace, and Partnership (UNDP 2015).

Food and agriculture is key to achieving the 2030 Agenda for sustainable development (FAO 2016). The objectives of this chapter is to identify the role of the agriculture sector in attaining the SDGs and to formulate policy guidelines to strengthen it. Relevant literature was reviewed and collected to see linkages of agriculture to different SDGs.

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[1] The Millennium Development Goals (MDGs) were eight international development goals for the year 2015 that had been established following the Millennium Summit of the United Nations in 2000, following the adoption of the United Nations Millennium Declaration.

[2] Nearly all the countries in the world have promised to improve the planet and the lives of citizens by 2030. They have committed themselves to 17 life-changing goals, outlined by the UN in 2015. These Global Goals, also known as the Sustainable Development Goals (SDGs), include ending extreme poverty, giving people better healthcare, and achieving equality for women.

## Relevance of Agriculture in Achieving the SDGs

In order to achieve the SDGs and their targets, food and agriculture can play an important role. While the global population rates may have tapered off, there is still rising demand for food, feed, and fibre. Per unit pressure on limited land has increased, resulting in increasing social and environmental costs. Sustainable production of food, feed, and fibre has abundant prospects to revitalise the rural landscape, provide inclusive growth to states and initiate positive revolution right through the 2030 Agenda. It is cost-effective and efficient because sustainable and higher agriculture production does not require huge investment. By adopting simple measures, technologies, and methods, agriculture can be improved and the social and environmental costs can be reduced (FAO 2018).

**Agriculture is the most common thread as compared to other sectors which holds the SDGs together. Therefore, agriculture must be made a central part of national development agendas (Annan 2017).**

Investment in agriculture will not only address hunger, malnutrition, and food insecurity, but also other challenges such as poverty alleviation, water and energy efficiency, climate change, responsible production and consumption (Rametsteiner 2016). In the following section, linkage of agriculture sector is analysed separately with 10 relevant SDGs.

### *SDG 1 – No Poverty*

SDG1 calls for eradication of poverty and in particular target 1.1 is about eliminating extreme poverty by 2030. Eradicating extreme poverty is also important to public and private actors, including investors, researchers, technical practitioners, and development partners engaged in the wide-ranging area of food, agriculture, and rural development (Campos et al. 2018).

According to the World Bank (2016), extreme poverty is minimum USD 1.90 a day income under the international poverty line. Almost 80% of the world's extreme poor live in rural areas where most of them are dependent on agriculture (Campos et al. 2018). Agriculture is the single largest employer in the world (Townsend 2015). Agricultural growth in low-income and agrarian economies is at least twice as effective as growth in other sectors in reducing hunger and poverty (World Bank 2008).

## SDG 2 – Zero Hunger

The Merriam-Webster dictionary defines 'hunger' as 'a very serious need for food: a severe lack of food.' It is also referred to as undernourishment, sometimes or 'food deprivation'. According to FAO (2012), hunger or malnutrition exists when 'caloric intake is below the minimum dietary energy requirement (MDER). The MDER is the amount of energy needed to perform light activity and to maintain a minimum acceptable weight for attained height.'

It is imperative to note that after a long span of stable decline in hunger, recently its pace has increasing in the world. Therefore, ending hunger by 2030 is an immense challenge (FAO, IFAD, UNICEF, WFP and WHO 2019). One in nine people on the planet suffer from hunger (FAO 2019).

**According to FFO (2020) projections, 805 million people are suffering from chronic hunger worldwide. Out of these about three-quarter are living in villages. A large majority of these people depend on agriculture for their food and livelihoods.**

Malnutrition and hunger impose extraordinary economic and social costs on society. These are mainly associated with extreme poverty and dearth of accessible, adequate, affordable, nutritious food at all times. Food security is defined by the United Nations' Committee on World Food Security (United Nations 1975), later adopted by the 1996 World Food Summit as follows:

**Food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (CFS 2012, p. 5).**

There is a need to form a programme for food security and livelihoods with the objective to allow vulnerable people access to foodstuff, revenue, and marketplaces. Extreme poverty, poor nutrition, and hunger are mainly rural, with smallholder farmers and their families forming substantial percentage of the poor and hungry. Hence, eliminating poverty and hunger are integrally associated with enhancing food production, agricultural efficiency and rural incomes.

There are four reasons why agriculture can kick start overall growth in the early stage of development. Firstly, it is a large sector; secondly, higher production reduces food prices; thirdly, there is a comparative advantage in processed and primary-based agricultural exports; lastly, the agriculture sector has strong forward and backward linkages with other sectors (World Bank 2008).

## SDG 4 – Quality Education

The most precious things in life are education and knowledge which enable improvement in livelihoods. In order to educate the farming community to produce more food, agricultural extension services[3] are utilised. These services are provided to educate farming communities to adopt scientific research and new knowledge for agricultural preparation and practices. It plays an important role in increasing agricultural production, yield of crops, boosting food security, and livelihood of rural communities. It also acts as an engine of pro-poor economic progress by bringing agricultural knowledge to the farming communities.

Agricultural extension education delivers a dire support facility to rural communities facing new areas of cultivation innovation such as changes in the feed and fibre structure, escalating superstores, value addition, sustainable supply chains, quality and importance of standards, markers/labels, food protection, increase in non-farm rural services and business, Sanitary and Phytosanitary Measures (SPS), health challenges that affect rural livelihoods, sustainability and climate change (FAO 2016). Obtaining quality education is the foundation for sustainable development.

**Access to quality agricultural extension education can help equip locals with the tools required to develop innovative solutions for inclusive rural transformation. The right to education is not only the right to access, but also the right to receive an education of good quality. Education must be available and accessible, but also acceptable and adaptable (RTEI 2020).**

## SDG 5 – Gender Equality

A research study on gender in agriculture revealed that 'yields on plots managed by women are lower than those managed by men. This is not because women are worse farmers than men. Indeed, extensive evidence shows that women are just as efficient as men. They simply do not have access to the same inputs. If they did, their yields would be the same as men's, they would produce more and overall agricultural production would increase' (FAO 2011).

Women are providing substantial support to the rural economy in Pakistan. Their role differs from region-to-region, but, they have less access to resources as compared to men. It is worth mentioning that in Pakistan livestock contributes more than 50%

[3] An agricultural extension service offers technical advice on agriculture to farmers, and also supplies them with the necessary inputs and services to support agricultural production. It provides information to farmers and passes on to them new ideas developed by agricultural research stations.

share in agriculture. All livestock rearing and production activities are undertaken by women, except marketing of products. However, there is no female livestock extension service available to women.

**It is imperative to increase women's access to resources, credit, land, technologies, extension services, employment, etc. This will boost economic growth, agricultural production, ensure food security, and social well-being.**

Reducing these gaps in agricultural inputs alone could lift 100-150 million individuals out of hunger. There are no hard and fast rules or guidelines on how to fill these gaps, but some fundamental universal principles may be applied such as good governance, international communities and civil organisations working side-by-side to remove gender discrimination through law and legislation that promotes equity and equality in resources and opportunities, and launching gender awareness projects so that women are treated as equal associates in sustainable development.

**Gender equality and empowering women is not only the right thing to do, but is also crucial for agricultural production and food security (FAO 2011).**

## SDG 6 – Clean Water and Sanitation

Water is life. Water is necessary for healthy human societies and for natural environments to prosper and grow. The world's population is approaching nine billion approximately. Half of these individuals could suffer from severe water stress by 2030 as a result of increasing urbanisation, different feeding practices and climate transformation.

**Water scarcity will hurt the security of millions if current levels of water consumption and pollution are not changed (UNEP 2016).**

Food and agriculture are major consumers of water. The main source of water - around 70% from rivers - is used for irrigation, while about 10% is used for domestic purposes. 20% is used by the industrial sector. About 3600 $km^3$ of freshwater is extracted for human consumption (Lenntech 2020).

**There is a need to have effective and efficient water management systems to maximise crop and water productivity by ensuring efficient conveyance, application and use of irrigation water vis-à-vis promoting improved water management interventions through user participation.**

Higher irrigation efficiency (IE) - usually 90% for drip versus 50% for surface irrigation - is connected with lesser rates of non-beneficial water consumption, generally because

of reduced soil evaporation (5% for drip and 20% for surface). These changes from a higher IE may result in a reduction in return flows, from 30% of water applied, in the case of surface irrigation, to 5% in drip irrigation (Grafton et al. 2018).

## SDG 7 – Affordable and Clean Energy

According to Eule (2020), the global energy demand is expected to grow by about 24% from 14.3 to 17.7 billion tonnes oil. The trend of growth by the year 2040 is forecast to be 42% higher and 7% lower in developing and developed economies, respectively. The share of global demand in developing countries will increase from 61% to 71%. Out of the total demand for renewable energy sources such as hydropower, wind, solar (PV and concentrated), biofuels, marine, geothermal, etc., is projected to rise by around 83% by 2040. More crops are likely to be diverted for use as biofuels, doubling or even tripling as a proportion of total use.

**Two key indicators can help assess the impact of biofuel developments on food security: food prices and household incomes. The more income a household or individual has, the more food (and of better quality) can be purchased. The problem with growing crops for fuel is that they take up land that could be used for growing food.**

## SDG 8 – Decent Work, Economic Growth and Employment

Low income elasticity of demand for agricultural products has resulted in decreased agricultural growth since 1990. Interestingly, agricultural value added per worker has developed faster than non-agricultural value added per worker in more than half of the countries, reflecting the drive of labour to non-agricultural areas as a portion of effective structural transformation practice (Byerlee et al. 2005). Byerlee and colleagues also found that the agricultural segment contributes the most towards inclusive poverty decline, followed by the services and informal sectors. They established that better growth in agriculture compacted together rural and urban poverty. However, pro-poor outcome was higher in the rural regions.

**Small and medium entrepreneurs in rural areas played a dynamic part in expansion and commercialisation of agriculture, boosted shelf life, guaranteed value addition to agro-products, created employment, augmented income of the farmer and created markets for export of agro-food.**

In developing countries, most rural women and men's livelihood depends on agricultural labour. However, most rural labour opportunities are unwarranted, underpaid, and even hazardous to their welfare. This results in trapping employees and

their relatives in a vicious cycle of poverty and hunger. That is why this SDG was formulated to support countries in creating decent work, economic growth and employment openings which guarantee minimum wage, safety in workplaces, availability of social protection and respect for basic human rights.

## SDG 12 – Responsible Consumption & Production

Overtime, the world population growth rate has dropped, while the amount of food intake has increased in a number of countries resulting in increasing demand for agricultural products. Projection shows that this would further rise in the coming years. There is substantial production prospective to manage the projected demand. It has been further estimated that developing countries may move towards agricultural import from agriculture export, and in a number of poor regions, food insecurity would become a serious issue till they boost local production (FAO 2002).

**It is important to note that despite decrease in demand, substantial amount (i.e., one-third) of food produced for consumption purposes is lost or wasted worldwide, which is estimated at 1.3 billion tonnes per year, starting from initial agricultural production to final household consumption.**

The waste in the form of land, water, energy, soil, seed, and other inputs used in agricultural production is also increasing Greenhouse Gas Emissions (FAO, IFAD, UNICEF, WFP and WHO 2019).

## SDG 13 – Climate Action

Climate change is a significant variation of average weather condition - conditions becoming warmer, wetter, or drier - over several decades or more. It is that longer-term trend that differentiates climate change from natural weather variability (Denchak 2017). It has serious and continuous influence in all aspects of daily life. It is not only an issue of mitigation, which seems impossible, but also adaptation, identification and reduction of risk. 'Studies show that, up to a certain point, crops and other plants grow better in the presence of higher carbon dioxide levels and seem to be more drought-tolerant' (Herring 2014). It is estimated that 9 out of 10 of the main crops would experience reduced, less or stagnant growth rate. But average prices would upsurge due to climate change. According to Folnovic (2020):

**By 2030, agriculture's carbon mitigation potential could reach as much as 7.5% of total global emissions, depending on the price of carbon and adoption of agricultural productivity measures.**

Organic farming should be encouraged given its increasing demand in the world. This would be useful not only from the environmental point-of-view, but farmers could also fetch a higher value.

## SDG 15 – Life on Land

The world's mounting feeding demand could be met by effectively and efficiently managing limited farm land resources keeping in mind the sustainability issue and minimising the damage to natural habitats, and forests for supplementary farming. Forests are a major source of biodiversity. They are a source of food, feed, fuel, and furniture. Forests are also a source of medicines.

**One-third of farmland is degraded, while up to 75% of crop genetic diversity has vanished, and 22% of animal breeds are under threat (FAO 2015). There is a serious need to draw policies for the conservation of forests and range areas for the protection of biodiversity.**

## Conclusion

SDGs are well prepared to tackle global development issues in sustainable ways. However, achieving the SDGs would not be possible without resilient, robust, and sustainable agricultural sector development. Moreover, this is the only sector which is a common thread that embraces all the 17 SDGs.

More than three-fourth of the world's extreme poor reside in rural areas, and out of these substantial numbers are dependent on agriculture. It is the largest employer of poor in the world. Agricultural growth in low income and agrarian economies is at least twice as effective as growth in other sectors in reducing hunger and poverty. Investing in this sector can address not only hunger and malnutrition, but also other challenges, including poverty, water and energy use, climate change, and, unsustainable production and consumption.

The demand for food will increase 50% by 2050. Therefore, there is urgent need for much more effort and innovation to sustainably boost agricultural production and improve global supply chains. Sustainable agricultural production increases food production, decreases food losses and waste, and ensures access to nutritious food to those suffering from hunger and malnutrition. It is possible to eradicate hunger within the next generation.

**The SDGs emphasise the importance of agriculture and the need to strengthen farming worldwide by supporting growers, increasing investments in research, technology and market infrastructure and extending knowledge sharing. This will catalyse innovation and empower farmers.**

Throughout the SDGs, farming first is bringing the collective voice of farmers, scientists and businesses working in agriculture to the forefront of the dialogue. While this brief study highlighted the importance and share of agriculture in 10 SDGs, there is a need to do separate in-depth empirical studies for identifying the role of agriculture under these 10 SDGs and develop separate policy recommendations.

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# Towards a Socially Responsible Digital-ready Future

## Impact of 4IR on Labour: A Case Study from Sri Lanka's Apparel Industry

## Natural Resources and Rights of Indigenous Communities: Policy Constraints in Case of Shimshal Valley, Gilgit-Baltistan and Role of Youth

## Preserving and Promoting Endangered Languages of Northern Pakistan in a Digital Age

Scholarly Article

# Impact of 4IR on Labour: A Case Study from Sri Lanka's Apparel Industry

*Chandima Arambepola*
Senior Research Professional,
Centre for Poverty Analysis,
Colombo, Sri Lanka

*Karin Fernando*
Senior Research Professional,
Centre for Poverty Analysis,
Colombo, Sri Lanka

*Navam Niles*
Research Associate,
Centre for Poverty Analysis,
Colombo, Sri Lanka

**Abstract**

The Fourth Industrial Revolution (4IR) could result in technological diffusion that causes severe disruption in the existing labour market and threaten its sustainability. However, neither diffusion nor disruption should be taken for granted. Instead, access to innovative technology, incentive to adopt that technology, and the eventual impact on labour - ranging from increased productivity to technological unemployment - will depend on the configuration of political and economic institutions of society. This chapter illustrates the experience of Sri Lanka's apparel industry, which has emerged because of specific political and economic institutions in the country. These institutions enabled the industry to integrate itself with the Global Value Chain (GVC) for apparels, which in turn allowed it to access 4IR technology and incentivised rapid technological innovation. However, ensuring the sustainability of labour requires additional institutions or modifications that help improve competitiveness in the industry, enhance social mobility of workers by expanding political rights and economic public goods, and reduce the negative environmental impact through global efforts to internalise the cost of pollution. The changes necessary to ensure sustainable labour in the age of the 4IR require institutional changes that go beyond any individual state. Global institutions must be created to effectively manage GVCs and enhance the sustainability of labour.

## Introduction

The Fourth Industrial Revolution (4IR), also called the digital revolution, builds on the Third Industrial Revolution, but has a far greater potential to disrupt existing global economic systems. Importantly, in the context of demand and supply for industrial goods, the 4IR is poised to disrupt existing industrial supply chains, especially in areas such as automation and digitalisation (McAfee and Brynjolfsson 2016; Schwab 2016; The Economist 2016). Potential of the 4IR is marked by a combination of three factors: velocity, scope, and systems impacts (Schwab 2016). This could result in 4IR technologies diffusing 'at an exponential rather than linear pace' (Ibid.). Such diffusion, with the concomitant disruptions, is particularly important in developing countries, which could leverage these disruptions to improve their economic diversity and comparative advantage.

Developing countries engage in exogenous, or catch-up growth, which allows them to leverage mature technological innovations. However, this depends on integration with global trade and investment networks - the source of technological diffusion (Acemoglu and Robinson 2012; McAfee and Brynjolfsson 2016; Pike et al. 2016; Sachs 2015). These trade and investment networks provide access to capital (including technology transfer and finance) and create an incentive to adopt the technology because adopters can develop more efficient economic systems that give them an edge over rivals. A prominent example today is China, which has become one of the technologically advanced economies after integrating itself into the global trade and investment system. Prior to its integration, the Chinese economy was marked by significant inefficiency and economic stagnation (Elms and Low 2013; World Bank et al. 2017). China, like many developing countries today, took advantage of these networks in the form of Global Value Chains (GVCs) (Gereffi and Memedovic 2003; Huynh 2015; World Bank et al. 2017).

**Through GVCs, developing countries are able to leverage their comparative advantage - often cheap labour - and specialise in one part of a complex production process.**

Firms in developed countries also benefit from a combination of outsourcing and off-shoring which allows them to relocate low value parts of the production process to reduce costs (Gereffi 1999; World Bank et al. 2017; McAfee and Brynjolfsson 2016). For example, the apparel industry, which led the industrial revolution in developed countries, was one of the first industries to be effectively relocated to developing countries, where cheap labour was coupled with mature industrial technology for mass production (Gereffi 1999; Lopez-Acevedo and Robertson 2016). Meanwhile, the more valuable parts of the production process - such as research, design, and marketing -

were retained by firms in developed countries. Nevertheless, such technological diffusion comes with its own set of challenges.

Perhaps the most important challenge revolves around the institutions designed to manage technological innovations and the possibility of technological unemployment.

**Developed countries, which are the sources of technological innovation, have more time to develop legislative and regulatory systems to manage disruptions. Meanwhile, developing countries struggle to catch-up.**

This is mostly because developing countries, which often have weaker institutions, have less time to develop responsive systems (Acemoglu and Robinson 2012). For example, labour rights and regulations for industrial activity, including the apparel sector, developed over almost a century. However, its diffusion to the developing world, which took place over a few decades, have raised serious concerns about workers' rights and working conditions (ILO 2016; Cowgill and Huynh 2016; Huynh 2015).

The institutional innovations from developed countries - which include political coercion, bargaining, and rent-seeking - are difficult to replicate because they are more place-specific. This is because institutions are not merely composed of formal rules such as laws and regulation, which are easier to copy, but also informal institutions such as habits, conventions, and social norms, which are harder to copy (Acemoglu and Robinson 2012).

For example, at the time of its independence, Sri Lanka replicated the legislative and regulatory systems of the United Kingdom (UK), but these rules were often influenced by local political, ethnic, and cultural considerations, which often favoured specific groups (Panditharathna and Jayatilake 2017). Furthermore, selective integration into the GVC can create a fragmented economy, which can result in a wide gap between the needs of highly globalised industries and available national public goods (Nedelkoska and Quintini 2018; WEF 2016). This is because the rest of the economy is shielded from international trade and investment, which limits the incentive to innovate and create public goods such as education, public regulation, infrastructure, and research. For example, in Sri Lanka, the highly productive apparel industry co-exists with a large informal sector, which employs about 60% of the labour force (Central Bank of Sri Lanka 2018b), where there is little incentive to adopt technological innovations. The difficulty in effectively adopting technological innovations pose a fundamental problem for policymakers trying to ensure that labour is not left behind in the shift to sustainable development.

**The 4IR affects every dimension of sustainable development - economic, social, and environmental - and labour is a part of every dimension.**

In the **economic dimension**, the 4IR could enhance labour productivity, thereby making some workers more efficient, but others could become redundant as their jobs become automated (Frey and Osborne 2017; Arntz and Gregory 2016; Schlogl and Sumner 2018; Nedelkoska and Quintini 2018; The Economist 2016). Economically, sustainable labour would involve moving or re-training workers to support or enhance their financial gains.

In the **social dimension**, the 4IR can help improve labour mobility by eliminating boring, dangerous, or socially undesirable jobs, while simultaneously providing workers with more flexible, safer, and more stimulating work (McAfee and Brynjolfsson 2016; Pinker 2018; The Economist 2016; Sachs 2015). Socially sustainable labour would entail embracing technologies that phase-out jobs no-one wants, but also ensure that workers are not left with unemployment and social stagnation (McAfee and Brynjolfsson 2016; Sachs 2015; Schlogl and Sumner 2018).

In the **environmental dimension**, the 4IR can help labour benefit from work with a lower carbon footprint and enhance the process of decarbonisation (Pinker 2018; Sachs 2015). Thus, environmentally sustainable labour would involve decoupling work with environmentally unsustainable consumption and production patterns.

These dimensions are cumulative.

**Sustainable labour must lean on economic growth, social inclusivity, and environmental sustainability. The use of 4IR, however, will not guarantee advances in any of these dimensions. Instead, it is a society's own institutional configuration and the broader global framework that will govern GVCs that determine whether sustainable labour applies to everyone, or remains merely a subset of the existing workforce.**

This chapter is based on a broader study of Sri Lanka's apparel industry (Fernando et al. 2020), which focused on three elements of sustainable development and sustainable labour: the global systemic barriers that influence sustainable development, the synergies and trade-off associated with policy choices, and the notion of 'leave no one behind'. The study focused on Sri Lanka's apparel industry because it is an industry that is heavily influenced by the 4IR. It also faces intense scrutiny both within the country and as part of a complex GVC.

The industry itself has tried to project an image of a sustainable industry (Lopez-Acevedo and Robertson 2016), and its outsized influence on the Sri Lankan labour market means its influence is critical for sustainable labour. It is the:

- largest source of Foreign Direct Investment (FDI) in the manufacturing sector at 26% (USD 862 million in 2017);
- largest sources of net exports – USD 4.8 billion (39% of total exports including services in 2017);
- employs between 300,000 - 600,000 people across varying skill levels (Department of Census and Statistics 2016), which is about 33% of total manufacturing employment, or about 12% of the 7 million national workforce (Central Bank of Sri Lanka 2018b).

The apparel industry has been able to integrate itself into the GVC and access 4IR because of the unique institutional configuration that emerged in the 1970s, which created the incentives for technological diffusion and innovation (Athukorala and Ekayanayke 2014; Fund 2018; Kelegama 2004; Panditharathna and Jayatilake 2017). However, its development also highlights the need for further institutional changes to sustainable economic opportunities, social mobility, and environmental sustainability, for workers, and the broader industry.

## Technological Diffusion: Institutionally Guaranteed

Labour can evolve to benefit from technological innovation that leads to better economic opportunities, social mobility, and environmental sustainability. However, much of this will depend on the institutions within society.

According to Douglass North, institutions are the basic rules of a society that help guide the actions of individuals and groups. Acemoglu and Robinson (2012) argue that institutions could be broadly categorised into two types: political and economic.

**Political institutions determine the distribution of power in a society, while economic institutions determine the distribution of economic gains and losses. There is a strong synergy between the two: the distribution of political power often determines the distribution of economic power.**

If political power is concentrated in the hands of a narrow elite, then that group can create economic institutions to extract resources to their benefit with little opposition (Acemoglu and Robinson 2012).

Inclusive political institutions distribute political power broadly or pluralistically within a centralised state, while inclusive economic institutions enable individuals to make their own consumption, production, and investment choices, together with a level playing field.

While Sri Lanka had a relatively inclusive political system, its shift towards an inclusive economic system only began in 1977, which was when it was able to create the necessary environment to attract foreign investment and stimulate domestic entrepreneurship (Athukorala and Ekanayake 2014; Kelegama 2004). This combination is what laid the foundations of the modern apparel industry.

The inclusive institutions that were the foundation of the apparel industry created the demand for both public goods and technology. The inclusive political system enabled the apparel sector interest groups to successfully lobby for a range of public goods such as education and technical training through public universities, specialised infrastructure for imports and exports, and regulatory systems to enable various partnerships with foreign firms and investors (Fernandez-Stark et al. 2011; Lopez-Acevedo and Robertson 2016; Kelegama 2004). The inclusive economic system, which involved less restrictive regulations in specially designated areas, created the incentive to seek and adopt newer technologies, which could give domestic firms an advantage over their foreign rivals (Athukorala and Ekanayake 2014; Kelegama 2004). As a result, the apparel industry was able to upgrade both its products and processes since its entry into the GVC (Fernandez-Stark et al. 2011), allowing it to dominate a niche market for more complex products, which generate higher value per unit.

The evolution of Sri Lanka's apparel industry, through the configuration of the country's institutions, has important lessons for its broader economy and other developing countries.

The role of institutions in technological diffusion has three important implications for the 4IR and sustainable labour:

**First, technological diffusion (and later, innovation) in any sector or industry will depend on the existence of specific incentives created by institutions.** If the political and economic institutions discourage diffusion of technology by failing to provide the necessary public goods or by limiting firms from investing in capital, then the 4IR, like previous revolutions, will have no discernible impact (World Bank et al. 2017; Acemoglu and Robinson 2012). This may explain the relatively low productivity of India's apparel industry, compared to both Sri Lanka and Bangladesh, which is often attributed to the highly restrictive labour regulations and the limited regulatory support for getting necessary imported inputs (Lopez-Acevedo and Robertson 2016).

**Second, technological diffusion will increase worker productivity, but the gains from that productivity will not be distributed evenly, nor is it possible to maintain labour productivity without constant institutional adjustment.** This is because increasing productivity and the shift to high-value output invariably reduces the value of simple repetitive work - such as that of a sewing machine operator. Instead, the increasing value will depend on the inputs of highly specialised workers such as designers, supply

chain managers, material scientists, and marketing experts (Fernandez-Stark et al. 2011). Thus, Sri Lanka's apparel industry is one of the most desirable employers, for high-skilled labour, but simultaneously struggles to retain workers, especially low-skilled ones (Department of Census and Statistics 2018).

**Finally, technological diffusion, may result in more efficient production, but may not necessarily lead to more environmentally sustainable work.** In the case of apparels, the institutions - both political and economic - necessary to internalise the global externalities involving pollution, do not exist (Gereffi et al. 2005; Vecchi 2016). Thus, the 4IR is enabling shorter lead times, lower prices, and more variety, but it is also resulting in unprecedented levels of waste because there is no framework to integrate the environmental cost in the final price of apparel products (The Economist 2018b; Vecchi 2016).

## The Economic Domain

Technological innovation in one part does not inevitably or automatically get adopted in other parts of the world. Instead, technology will only be adopted when there is compelling incentive, such as the possibility of earning higher profits through greater efficiency. When such an incentive exists, the benefits of adopting new technologies outweigh the costs of those investments (Acemoglu and Robinson 2012; The Economist 2016 and 2017). Thus, firms that are integrated into GVCs have been found to be more productive than firms not part of GVCs (Lopez-Acevedo and Robertson 2016).

In the case of Sri Lanka, smaller firms (less than 25 employees), which are less likely to be part of the GVC, have a consistently lower value/added per worker: in 2014, such firms recorded LKR 534,225 (approx. USD 4,006) value added/worker, while larger firms (25+ workers) recorded a value added of LKR 876,231 (approx. USD 6,571). Sri Lanka's Board of Investment (BoI) maintains separate records of output per worker from firms registered for apparel exports. This data shows a three-fold improvement in productivity between 2000-14, from LKR 670,419 to LKR 1,817,186 (about USD 3,600 to USD 9,900 based on the average exchange rate of about LKR 183) (Central Bank of Sri Lanka 2018a; Department of Census and Statistics 2016). This rapid increase in productivity was closely associated with large investments in capital, where foreign investments consistently accounted for more than half of the total investments. However, while export-oriented firms have a powerful incentive to seek and adopt innovative technologies to gain a competitive advantage over their global rivals, the same does not automatically hold for the entire industry or other sectors in the economy.

**The demise of Sri Lanka's textile industry, which is closely associated with but is different from the apparel industry, is a good example of institutional incentives for innovation.**

In the 1960s, Sri Lanka had a developing textile industry, which collapsed when the economy closed in the 1970s (Kelegama 2004). This is because the closure of the economy meant that textile firms could not benefit from technological diffusion through trade and investment networks. When the industry was revived during the liberalisation period in the late 1970s, it was dominated by government firms and heavily shielded from foreign competition - the government did not make an effort to integrate the industry into the GVC as it was doing with apparels (Ibid.). Once again, economic institutions discouraged any investment in technologies that could improve the quality, quantitative, and cost of textile outputs. The poor productivity in the sector led to increasingly high dependence on textile imports from East Asia, which in turn limited the efficiency of the apparel industry because textiles are a key input (Athukorala and Ekayanayke 2014; Kelegama 2004; Lopez-Acevedo and Robertson 2016).

In 1997, following the Asian financial crisis, protection for the textile industry became unsustainable, and textile tariffs were removed. The removal of tariffs led to an immediate decline in the industry and production of textile categories, under HS Code 6001-6005, never recovered (UNSD 2018). Unlike the apparel industry, the textile industry had not made significant capital investments and was unable to match the efficiency of the highly automated textile production in East Asia (Ibid.).

However, over the years, the apparel industry has made significant investments in the local textile industry, as part of a strategy to enhance its backward-linkages and reduce the cost of production (Kelegama 2004). These investments have focused on automated production and growth centred almost exclusively on products categorised under HS 6006, that is other knitted or crocheted fabrics (UNSD 2018).

**Contrast between the apparel industry and the textile industry is a good example of the role of institutions and technological diffusion that makes industrial upgrading possible.**

In comparison to the textile industry, the apparel industry is a good example of inclusive institutions that actively attracted technological innovations through trade and investment. With the liberalisation of the economy in the late 1970s, the country began developing of industry-specific inclusive institutions to develop Export-Oriented Industries (EOIs) (Athukorala and Ekayanayke 2014; Fernandez-Stark et al. 2011; Kelegama 2004; Panditharathna and Jayatilake 2017). The choice of apparels was partly informed by its comparative advantage - a large pool of comparatively cheap

labour - and international investors keen to access Western markets through the country's Multi Fibre Agreement (MFA) quotas (Huynh 2015; Athukorala and Ekayanayke 2014; Kelegama 2004; Panditharathna and Jayatilake 2017). Thus, for example, the government created and maintained Special Export Processing Zones, and actively sought FDI through mechanisms, inter alia, special taxation and regulatory regimes (Kelegama 2004; Panditharathna and Jayatilake 2017).

Institutions that encouraged international trade and investment were supported by policies that encouraged internal labour migration and human capital development. Encouraging more internal migration meant that the industry could maintain its comparative advantage, and human capital development enabled it to take advantage of upgrading - both pre-production and post-production (Fernandez-Stark et al. 2011). Examples of such efforts include Public-Private Partnerships (PPPs) and coordination between the government and the industrial body JAAF (Joint Apparel Association Forum of Sri Lanka), which led to dedicated vocational training programmes and the establishment of specialised research and development units within public universities (Athukorala and Ekayanayke 2014; Fernandez-Stark et al. 2011).

The industry also benefited from a variety of PPPs. The relationship meant that the industry could participate in the design of effective policies and provide feedback on existing policies (Fernandez-Stark et al. 2011; Lopez-Acevedo and Robertson 2016). For example, the various PPPs included the Productivity Improvement Programme and the Technical Training Programme (Fernandez-Stark et al. 2011) for human capital development and various reforms - including tariff changes - to enable backward linkages into textiles. These institutions created an industry that competes across a GVC, which comes with its own opportunities and challenges.

Through its integration into the GVC, the apparel industry has managed to upgrade its position and has a powerful incentive to innovate and adopt new technologies. Sri Lanka's apparel industry has embarked on industrial upgrading, increasing the value added throughout the manufacturing process.

This transition has led from a simplified CMT (Cut Make Trim) towards OEM (Original Equipment Manufacturer), and eventually ODM (Original Design Manufacturer) status (Fernandez-Stark et al. 2011; Gereffi and Memedovic 2003; Kelegama 2004). At this stage, key firms in the industry, have developed their own in-house design and marketing teams, which work together with their multinational clients that include Nike, The Gap, M&S, and Victoria's Secret (Nike 2018; Lopez-Acevedo and Robertson 2016).

The process of industrial upgrading was only possible, especially in the early stages, with FDI in the form of joint ventures, and later, strategic partnerships. Foreign investment was crucial because Sri Lanka lacked the capital to build the hard

infrastructure and logistics necessary for integration into the GVC. It also lacked the technical knowledge and market expertise to actually produce goods for the consumers located in developed markets (Athukorala and Ekayanayke 2014; Fernandez-Stark et al. 2011; Kelegama 2004; Lopez-Acevedo and Robertson 2016; Panditharathna and Jayatilake 2017).

Between 2005-17, foreign investment increased from LKR 45 billion to LKR 176 billion (about USD 245.9 million to USD 961.7 million at an average exchange rate of LKR 183), with foreign investment as a proportion of total investment rising from LKR 30 billion to LKR 92 billion (about USD 163.9 million to USD 508 million at an average exchange rate of LKR 183) (Central Bank of Sri Lanka 2018a). This growing proportion of local investment relative to foreign investment also signals a shift from FDI through joint ventures towards strategic partnerships (Athukorala and Ekayanayke 2014; Fernandez-Stark et al. 2011; Kelegama 2004; Lopez-Acevedo and Robertson 2016; Panditharathna and Jayatilake 2017).

In addition to access to capital, there is a real incentive to innovate because the industry faces severe competition from countries located in other parts of the GVC (Huynh 2015; ILO 2016; Lopez-Acevedo and Robertson 2016). Competition from other countries, such as Vietnam and Bangladesh, means that Sri Lanka is unable to continuously leverage cheap labour; instead, its strategy has shifted to high-value production, leveraging its expertise in the pre-production and post-production stages.

**Thus, inclusive institutions, that laid the foundation for the apparel industry in Sri Lanka, allowed it to access capital investments from abroad, but also simultaneously and continuously pushed the industry to innovate to out-compete rivals within the region.**

It must be noted, however, that such growth and development has also led to consolidation within the industry, with three of the largest firms accounting for an increasing share of the export market. Larger firms are able to enter into a virtuous cycle of investment and innovation because their scale allows them to attract foreign investment, forge strategic partnerships, and invest in capital (Elms and Low 2013; Fernandez-Stark et al. 2011; Gereffi and Memedovic 2003). Meanwhile, smaller firms risk entering into a vicious cycle of declining market share and under-investment.

## The Social Domain

The institutional configuration that enabled Sri Lanka's apparel industry to emerge as a key element of the GVC is ideal for economic growth. However, the ability of labour to evolve in response to these new opportunities is not the same across different skill levels, which necessitates a variety of complementary institutions to ensure

sustainability in the form of social mobility. The 4IR, unlike the earliest revolutions, will enable highly skilled workers to evolve by allowing them to increase their share of value-added in the final product (Arntz and Gregory 2016; Frey and Osborne 2017; McAfee and Brynjolfsson 2016; Nedelkoska and Quintini 2018; The Economist 2016; WEF 2016). As a result, the net effect of the 4IR on the apparel industry - perhaps measured in productivity, exports, or revenue - is positive, but the share of those gains will flow towards high-skilled workers (McAfee and Brynjolfsson 2016). The disproportionate distribution of economic gains is strongly associated with the narrative of 'good work' that is essential to social mobility. Disproportionately poor economic gains may increase sensitivity to working conditions, the possibility of progression, and the overall ability to achieve social goals through labour, such as good reputation and prestige (Müller and Pollak 2015). To enable social mobility, complementary institutions are necessary to enhance human capital (Nedelkoska and Quintini 2018; Pinker 2018; Sachs 2015; Winkler and Satterthwaite 2017). These institutions could include education, transportation, social safety nets and sustainable internal migration.

**Importantly, complimentary institutions should also enable women, who constitute a bulk of the low-skilled workers in the industry, to build long-term careers in the industry by upgrading their skills and offering them more opportunities to participate without compromising their family goals.**

Without such institutions to enable social mobility both firms and workers within the industry face long-term challenges. Firms may struggle to maintain their labour force, while workers, especially low-skilled ones, may have to choose between decreasing returns to labour within the industry, seeking employment elsewhere with their narrow range of skills, or leaving the labour force entirely.

The 4IR and its influence on a highly integrated industry such as apparels, clearly favours high-skilled labour. Labour can be categorised into four different groups based on two variables:

1. manual or cognitive labour; and
2. routine or non-routine labour (Nedelkoska and Quintini 2018b).

At the two extremes are cognitive non-routine workers and manual non-routine workers.

**High-skilled workers** are those who depend on non-routine cognitive work. In the case of apparels, designers would fall in the high-skilled category, while sewing machine operators would fall into the low-skilled category (Fernandez-Stark et al. 2011).

**Low-skilled workers** are those who depend on non-routine manual work. In the case of apparels, these workers may include line leaders or supervisors, tailors (small ad-hoc tasks), etc. (Nedelkoska and Quintini 2018).

In-between the non-routine categories, are workers who are engaged in routine work - both cognitive and manual. Cognitive routine work may include cutting machine operators and quality control personnel. Manual work of this sort may include sewing machine operators, garment pressers and packers (Fernandez-Stark et al. 2011).

**While many workers have a combination routine and non-routine tasks as their jobs, 4IR reduces the value-added of routine work through hardware and software automation, thereby, expanding the gap between routine and non-routine workers (Fernandez-Stark et al. 2011).**

Thus, if a worker contributes more value through parts of their non-routine work (such as designers who must invariably fill a few forms), automation and digitalisation could allow them to focus more of their attention towards that non-routine work (more designing and less filing). In contrast, workers who contribute value through mostly routine work, may find their share of the total value added decline over time (Fernandez-Stark et al. 2011; McAfee and Brynjolfsson 2016; Nedelkoska and Quintini 2018; The Economist 2016 and 2017). This explains the relatively stagnant or slow-growing wages for low-skilled workers. Meanwhile, high-skilled workers have been able to benefit from consistent and rapid increase in wages (McAfee and Brynjolfsson 2016; WEF 2016).

Thus, the process of industrial upgradation has allowed non-routine workers, especially those engaged in cognitive work, to capture a larger share of the total value added, thereby, enhancing their economic opportunities and social mobility. The same cannot be said of workers engaged in more routine work, especially routine manual work.

The impact of automation and digitalisation on low-skilled workers affects their economic progress and heightens sensitivity to social mobility. While social mobility is closely associated with economic mobility, the former emphasises the prestige or status of a job (Müller and Pollak 2015).

**Prestigious jobs are an important part of the narrative of 'good work'. The prestige of a job compensates for its economic value and vice versa.**

In the case of apparels, the early industry provided low-skilled workers, who were often female migrants to cities, with far better economic opportunities than any alternative available that was good enough to overcome any social stigma that came with the work or migrant status. The work could be considered demeaning and migrant women were often accused of sexual impropriety (De Casanova 2008; Hewamanne; 2003;

Hewamanne 2011; Müller and Pollak 2015; Chen et al. 2019). These workers could overcome social stigma because they could use their economic benefits to gain social capital through various means. They are able gain a good reputation by financially supporting their families, presenting larger dowries to improve their marriage prospects (for women), and through economic investments in their villages and towns (Hewamanne 2003 and 2011). As these economic gains start shrinking, many lower-skilled workers may find it difficult to compensate for the social stigma (Chen et al. 2019; De Casanova 2008). In this situation, it is no longer 'good work', but work that must be done out of necessity, and one that is not worth investing additional time, education, or skill development. For these workers, there is good reason to leave the industry as soon as possible to avoid derogatory terms like 'juki girls', which refers to internal migrants who are somehow considered immoral, deracinated, and sexually tainted (Lynch 2007).

The fact that the industry can still attract hundreds of thousands of women (who constitute the bulk of the half a million workers engaged in the industry) (Department of Census and Statistics 2016 and 2018) means that despite their shrinking gains, the industry is still considered an important source of economic opportunity. However, this may also explain why the industry struggles with chronic attribution and difficulty retaining workers, even in the case of the largest firms that are able to deploy relatively generous incentives (Department of Census and Statistics 2018). Thus, there is an urgent need to develop complementary institutions that can lead to lasting social mobility.

**Complementary institutions – ranging from education and training to social safety nets – are necessary to absorb the disproportionate impacts of the 4IR. Most importantly, they enable social mobility of low-skilled workers in the apparel sector, by enhancing their human capital and contribute to the narrative of 'good work' (Fernando et al. 2020; Huynh 2015; Lynch 2007; Pinker 2018).**

Just as the integration of the apparel industry into the GVC was enabled by institutions that expanded certain political and economic rights, sustainability will depend on complementary institutions that effectively mitigate risks - including that from the 4IR - emerging through the GVC. This would involve creating a range of public goods to sustain the productivity of the industry without compromising the well-being of workers (Acemoglu and Robinson 2012; Lopez-Acevedo and Robertson 2016; McAfee and Brynjolfsson 2016; Pinker 2018; Winkler and Satterthwaite 2017). These complimentary institutions would require expanding political and economic rights even further - to include more workers and firms that are marginalised by the status quo.

Since political rights influence economic rights, the immediate priority should be expanding political inclusion, especially for the vast number of economic migrants (Acemoglu and Robinson 2012).

Fernando et al. (2020), in interviews with workers, emphasised the need for political inclusion through better representation achieved by *inter alia*, enhancing voting rights, improving residential rights for migrants, and the ability to petition local governments near the free-trade zone. Many workers claimed that without such political inclusion, they were unable to lobby for more inclusive economic institutions that would make the labour market more competitive, thereby pushing wages to match the marginal product of their labour.

**More inclusive economic institutions could provide workers with access to specific public goods - such as education, training, childcare facilities, and social safety nets - to help improve their human capital.**

It is important to note that the underrepresentation of women in political institutions like the Parliament (women constitute only 5% of the total Members of Parliament), may explain the lack of economic public goods that enhance female labour force participation in the apparel industry and beyond (Dissanayake 2019). The development of these complementary institutions depends, to a large part, on expansion of political and economic inclusion that goes well beyond the apparel industry itself. Such reforms are necessary as the industry itself has become deeply integrated into the national economy.

## The Environmental Domain

The 4IR diffused through globalisation, which includes the GVC for apparels, has allowed the development of Sri Lanka's apparel industry. A regulatory regime for a GVC could be described as a Global Public Good (GPG) because the benefits of such a regime are non-excludable and non-rivalrous (Cepparulo and Giuriato 2016; Cornes and Sandler 1996). For example, quality assurance standards for apparels (e.g., avoiding toxic substances) benefit all consumers and even producers.

Unlike other GPGs - such as a stable ozone or climate that may invite a free-rider problem - regulating a GVC benefits every link in the chain and avoids a free-rider problem because no actor benefits by providing less than the minimum (Cepparulo and Giuriato 2016). For example, Sri Lanka could gain some competitive advantage over other rivals in the GVC, by reducing labour standards in the apparel industry, but this would also harm its own workers. The problem, however, is that the regulations will be determined by the 'weakest link' because any effort to create regulations above the common minimum will go unrewarded (Caparrós and Finus 2016; Cepparulo and

Giuriato 2016). In the classic example, a group of individuals who independently build sections of a common flood defence are only as safe as the weakest section; building some sections above the minimum standard would still fail to prevent a flood if even one of the sections is too weak. Similarly, if one firm or regulatory body sets higher standards and those higher standards incentivised firms to relocate to countries with minimum standards, then those firms or regulatory bodies will only incur higher costs and the overall environmental or labour conditions will remain the same (Caparrós and Finus 2016; Gereffi et al. 2005; Vecchi 2016).

This raises the obvious problem for Sri Lanka's apparel industry, that while the GVC affects every aspect of its functioning such as labour standards, product specification, and infrastructure - the question of environmental sustainability and the role of labour are particularly important. Sri Lanka's apparel industry has thrived with the rise of 'fast fashion' in the West, but its ability to manage environmental sustainability of the GVC is beyond its control, which has strong implications for the sustainability of its labour force. Fast fashion puts an emphasis on rapid cycles of fashion, sometimes seasons lasting a few weeks (Vecchi 2016). For example, one fast fashion clothing retailer, Zara, offers up to 20 lines of clothing each year, enabled through the apparels' GVC (The Economist 2018b).

The demand associated with fast fashion has allowed for a significant increase in the volume of clothing. Each year about 80 billion new garments are sold around the world, which is a 400% increase in 40 years (The Economist 2018a). In the United States (US) alone, a key market for apparels manufactured in Sri Lanka, consumers purchase about five times more garments than they did in the 1980s (The Economist 2018a). Overall, the potential impact on the climate and the wider environment can be highly significant. It is also estimated that if 80% of the emerging markets mirror the shopping habits of developed markets, then GHG emissions could increase by 80% per-capita. This would make it impossible to meet the commitments of the Paris Climate Agreement (The Economist 2018a).

**If the Sri Lankan industry's environmental impact is stitched together with the demand cycles of its key markets, then any effort to improve environmental standards cannot be achieved through the supply side alone.**

Currently, the Sri Lankan industry approach to sustainability is through supply side efficiency, enabled by the 4IR, but limited by the unsustainable demand emerging through the GVC. Firms, especially the largest ones, have invested heavily in 4IR technology to increase efficiency and reduce energy use (Lopez-Acevedo and Robertson 2016). These efforts include automated processes, decarbonisation through digitalisation, and a greater reliance on renewable energy. Nevertheless, the increasingly efficient manufacturing process only exacerbates the fast fashion cycles.

Faster, cheaper, and more efficient manufacturing works to reduce prices even further. This leads to a corresponding rise in demand, which limits the benefits of cleaner production. These costs will only keep falling because there is no overall mechanism to internalise the environmental externalities of the apparel sector. The pollution caused by the GVC, and by extension Sri Lanka's apparel industry, are a negative cross-border externality, which means every link in the GVC enjoys the full benefits of the economic activity, but only experiences a fraction of the costs (The Economist 2018a; Vecchi 2016).

**To effectively regulate environmental impact, every firm and regulatory body along the GVC needs to internalise the cost of pollution. This means that regulatory authorities in the key consumer markets need to increase the prices of clothes to reflect global environmental pollution.**

The failure to regulate environmental pollution in the GVC represents the weakest link that is beyond the control of Sri Lanka's regulatory authorities and manufacturers. While the 4IR can help labour evolve to produce clothes more sustainably, this contributes to more pollution in the absence of measures to regulate sustainable demand.

## Conclusion

Sri Lanka's apparel industry is just one example of how technological innovations in any part of the world can diffuse through international trade and investment networks. The experience of the industry shows such diffusion is not inevitable - there must exist institutions that create the incentives for firms to adopt that technology. These institutions must be economically inclusive, enhance the property rights of entrepreneurs, encourage competition at home and abroad, facilitate foreign investment, and create the necessary public goods that give domestic firms a competitive edge over their rivals.

Economically inclusive institutions reward the adoption of innovative technology and the development of human capital. As a result, Sri Lanka's apparel sector has managed to upgrade itself from CMT to more complex OEM and ODM. However, sustaining these economic gains, while also enhancing social mobility and environmental sustainability, is a separate challenge.

To maintain a sustainable labour force, the industry will need to examine impact of the 4IR in all three dimensions of sustainability: economic benefits, social mobility, and environmental sustainability. There is no doubt that 4IR will economically benefit the industry, but without institutional changes, its gains will be disproportionately

distributed – both amongst firms (favouring larger firms) and workers (favouring the highly skilled). As a result, in the social domain, workers engaged in routine work (especially low skilled workers) may find their social mobility weakened as they struggle with declining wages and increasing social stigma associated with the industry. In the environmental domain, the 4IR may have contributed to more efficient production, but with no mechanisms to internalise the negative externalities, the GVC for apparels has become the most polluting industry, after oil (The Economist 2018b; Vecchi 2016). These challenges must be met by modifying existing institutions and creating new ones, especially at the global level. Institutional reform must also focus on all three domains and extend from the local to the global.

In the economic and social domains, there is an urgent need to make political and economic institutions more inclusive, including more women and migrants. This, in turn, should encourage the provision of public goods - such as education, housing, and childcare - that allow workers to remain in the industry and extract more economic gains and social mobility. Of course, expanding political and economic inclusion would require changes that go beyond any single industry, but given the apparel industry's significant position in the economy, it is a good place to begin.

**A GVC requires a global institution to internalise the social and environmental costs of fashion. Only systematic effort to reflect the negative externalities in the final price of a product could make the industry - and the labour that depends on it - more sustainable.**

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Working Paper

# Natural Resources and Rights of Indigenous Communities: Policy Constraints in Case of Shimshal Valley, Gilgit-Baltistan and Role of Youth

*Ali Rehmat*
Project Assistant,
Resilient Development Programme,
Sustainable Development Policy Institute,
Islamabad, Pakistan

**Abstract**

Pakistan's national policies about the use of natural resources, including mining and conservation, do not incorporate the needs of indigenous communities which is creating conflict of interest among relevant stakeholders. Focusing on the Shimshal community in Gilgit-Baltistan, the study finds that the current policy development processes regarding natural resource management and utilisation, do not involve local communities, and this is jeopardising their livelihoods. As a result of this disconnect, major conflicts also arise between the state and local communities.

The study calls for the inclusion and consent of indigenous communities during the process of policy development and provides recommendations for safeguarding their traditional rights and common property resources when it comes to conservation efforts and mining projects. Relevant national policies need to be revised for safeguarding the interests and livelihoods of local people as well as local ecology.

## Introduction

In the face of climate change, creating a balance between development and protection of natural resources is a major challenge for policymakers, investors and communities. Both run in parallel, but are also simultaneously interlinked. This phenomenon, although taking place in other parts of the world, also seems to be affecting the indigenous people of Pakistan, including inhabitants of Gilgit-Baltistan. The indigenous Shimshalis are facing a major challenge in striking a right balance between managing local common property resources, protecting the environment and initiating development activities.

**The disconnect between state policies and the needs of the local people are a major source of concern for indigenous communities like Shimshalis whose lives are intimately tied to the fate of their local common property resources.**

This chapter specifically explores a vital gap between the national policies on conservation and mining, and the rights of the indigenous communities in Gilgit-Baltistan which is creating conflict between the communities, government and mining companies. It highlights the flaws in the national conservation/mining policies and implications for the local communities while studying the formation of the Khunjerab National Park (KNP) and mining issues faced by the community of Shimshal. It also highlights the role of youth, education, social and political awareness in addressing these issues and provides policy recommendations for amendments to national policies to overcome conflicts over ownership and stewardship of natural resources.

**The conservation approaches in Pakistan are deeply problematic as they are dependent on abandoning the very land and livelihoods of pastoral communities. Most often, it is assumed that the practices of indigenous communities pose immense threat to nature instead of acknowledging that the latter is deeply embedded in their social norms and cannot be protected without recognising the rights, values and ownership of the local people.**

Many conservation initiatives are framed in the name of 'sustainable development' without taking into account the concerns of local communities and centuries-old practices, and serve to entrench power of the state and a few elite beneficiaries over indigenous communities and local ecologies (Ali 2010). Conflicts occur in conservation areas when interests of an outside group (or groups) are in opposition to those of the land and its inhabitants. They occur when:

- Free Prior and Informed Consent (FPIC) of indigenous/local people and interested parties is not taken, and they are not involved in the decision-making, planning and management of the conservation area; and,

- Community needs like firewood, grazing, building material, fodder, hunting and medicinal plants conflict with the objectives of the conservation or development project.

Excluding local people and other interested/affected parties in a conservation planning or management process means that they lack the opportunity to identify and describe traditional or land tenure rights, which can also create real or perceived feelings of apathy that frame all future interactions (Borrini-Feyerabend 1997).

**Protected areas are usually recognised by the state. In South Asia, such arrangements are often in conflict with local livelihoods as seen in most cases in the Himalayas, HinduKush, Karakoram and Pamir mountainous regions.**

The concept of protected areas does not support the inclusion of local communities and consumer groups as part of the natural system, rather it neglects their role in maintaining and shaping landscapes. In the South Asian context, the states often neglect the priorities and livelihoods of the local communities in conservation. Therefore, it is important to look into the implications of establishing protected areas (Sharma et al. 2010).

**The main consequence of establishing protected areas in Pakistan without FPIC is that indigenous communities lose control over the natural resources in their areas.**

Most of the communal lands in Northern Areas which were managed through customary laws have been converted into protected areas (Shackleton 2001).

The first part of this chapter discusses the Khunjerab National Park (KNP) which is the face of such a 'conservation dilemma' that led to the dismissal of the rights of local communities to natural resources. The imposition of strict policies by the State undermined local livelihoods. In turn, the establishment of this protected area prompted conflict that resulted in the reluctance of local communities to participate in efforts towards collaboration with the government (Berkes et al. 1991). The second part of the chapter highlights the issue of awarding mining rights in such protected areas to investors without consultation of locals and without following due environmental protocols.

## Establishment of KNP and Concerns of Shimshalis

**Figure 1: Map of Shimshal, Gilgit-Baltistan**


*Source:* Butz and Cook 2017.

Shimshal is located at the north eastern periphery of Gilgit-Baltistan in the Central Karakoram region along the border of Pakistan with China, comprising about 2,700 km² of high altitude land. It is inhabited by an agro-pastoral community of approximately 2,500 people who maintain several village settlements, over a dozen communal pastures for seasonal herding of livestock and enough irrigated land to fulfil their food requirements.

**Over the past decades, whatever development has taken place in the Valley has been done through philanthropic contribution and volunteer work, including the construction of irrigation channels, pony tracks, bridges, shelter homes, land development, environmental development activities and community institutions. Volunteers often include retired soldiers, students, teachers and scouts.**

**Figure 2: Shimshal Community Volunteers Repairing Blocked Road, Veyeenben Shimshal**

*Source:* Passu Times 2016.

In 1975, the Northern Areas Wildlife Preservation Act was passed, under which the administration of Northern Areas, now Gilgit-Baltistan, could declare any area in its territory as a wildlife reserve/sanctuary or national park. Through a notification and in the same year, the 2,270 km$^2$ Khunjerab National Park (or KNP) was established as the first national park in the Northern Areas comprising the grasslands of the Khunjerab, Ghujerab, and Shimshal valleys in the upper Hunza region of Gilgit-Baltistan (Ali and Butz 2003).

KNP was recommended and demarcated by the famous American field zoologist George B. Schaller who was associated with the Wildlife Conservation Society and visited Pakistan numerous times between 1970 and 1975.

**The main reason for establishing KNP was to protect the endangered Marco Polo sheep, as well as the preservation of other Asian wildlife species such as the blue sheep, snow leopard, brown bear, and Himalayan ibex (Ali 2010).**

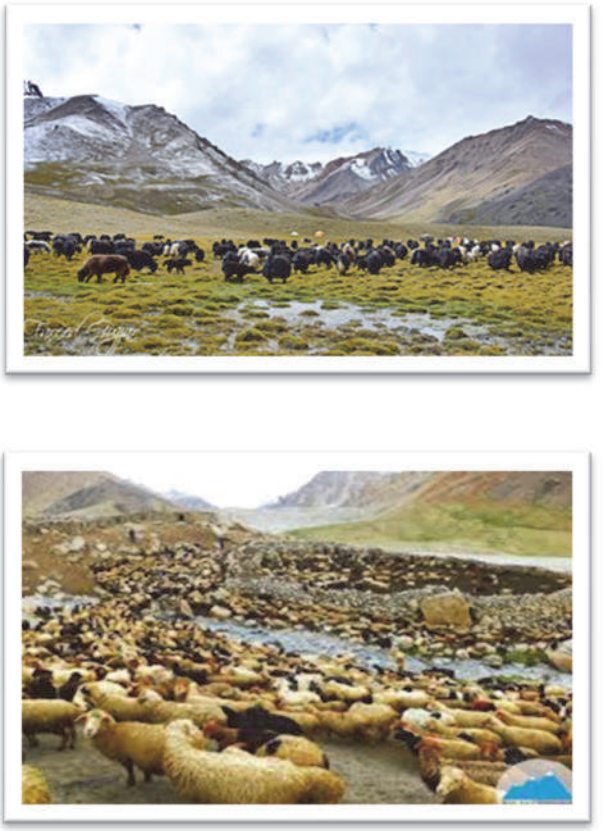
The park boundaries included parts of Shimshal's 2700 km² traditional commons and those of eight other villages.

The creation of this Park took the Shimshalis by surprise. In the 1970s, little consultation on park restrictions and local use regimes took place. By 1990s, this had become the centre of a national controversy between the government and local communities (Abidi-Habib and Lawrence 2007) when it was designated as a Category II Park. According to the guidelines provided by the International Union for the Conservation of Nature (IUCN), this meant that human activity such as hunting and grazing was banned and visitors were allowed only for 'inspirational, educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state'(Knudsen 1997).

**KNP became a battleground between conservationists and local communities. The Park policies undermined livelihoods, violated the customary land use rights of the affected Wakhi villagers, especially Shimshal Valley and threatened their future.**

The main worry of Shimshalis was the loss of their ancestral land and livelihoods as in 1995, they owned a total of 4,473 goats, 2,547 sheep, 960 yaks and 399 cows; and continue to have major livestock holdings in the Hunza region (Ali and Butz 2003).

**Figure 3: Shimshal Pamir Pastures: Natural Resource Dependency of the Community**



*Source:* (L) Fareed Gujjar (Gujjar 2015). (R) Emaan Dad (Dad 2015).

Shimshalis argue that the KNP was created without consulting them and taking their FPIC regarding its boundaries, regulations, or management. They were simply informed that most of their traditional pastures, and even some of their village settlements, were now part of a state-owned national park (Ali and Butz 2003). The enforcement of park regulations could have resulted in a complete ban on grazing and hunting in most Shimshali pastures to preserve wildlife and their habitats. This was a direct threat to their livelihoods (Ali 2010).

**Figure 4: Shimshal Valley: Agricultural Dependency of Community**

*Courtesy:* Saeed Zaman Shimshali 2019.

## Resistance of Shimshalis against KNP

Until the mid-90s, Shimshalis resisted the implementation of the KNP management plan, drafted by bureaucrats and the IUCN, by not following the administrative protocols, disrupting information gathering mechanisms and blocking government and Non-Government Organisation (NGO) officials from entering the Valley (Butz 2002). This confrontational stance of the community and complete rejection of the Park plan was proving to be counterproductive, and served only to reinforce the stereotype of

Shimshal as a backward community lacking the capacity to provide alternative solutions through legal means.

In this scenario, a group of local youth felt that the community could eventually suffer extensive state action unless it was able to negotiate efficiently with conservation organisations. After much deliberation, they came up with the idea of a community-based conservation organisation called Shimshal Nature Trust (SNT) that would own, manage and showcase the community's conservation efforts and represent it in dealing with external organisations.

**The primary challenge was not to develop a system of utilising natural resources sustainably, but to make the Pakistani authorities understand that the community was capable of protecting and managing its natural resources through indigenous stewardship practices (McMichael 2010).**

At the 5th World Parks Congress in South Africa in 2003, the SNT was the only community-based Pakistani organisation to showcase its management plan. Its aim was to retain indigenous control over Shimshal's environment.

**SNT's management programme included nature stewardship, environmental education, village development, certified trophy hunting, preservation of local culture, promotion of tourism, setting up a mountaineering school, women's development, and improving the quality of life in a culturally and environmentally sensitive way (Abidi-Habib and Lawrence 2007).**

By March 2008, the SNT managed to sign a Memorandum of Understanding (MoU) with the then-Northern Areas Wildlife and Parks Department, which acknowledged and guaranteed the land use rights of Shimshal. The KNP authorities also withdrew criminal charges against Shimshal's young community members.

In 2009, a field visit was conducted by the Directorate of KNP Department, Gilgit-Baltistan Wildlife Department, WWF-Pakistan, Shimshal Community-Controlled Hunting Area (CCHA) representatives and Sokhterabad Community-Controlled Hunting Area (SCHA) representatives. The main objective of this field visit was to have a meeting with the local communities of Shimshal and Sokhterabad to resolve the boundary conflicts between the KNP and CCHA. During discussions with the communities, members of the KNP, CCHA and Wildlife Department identified the common boundary between the KNP and CCHA (Shahzad et al. 2010).

## Constraints in Resistance against KNP

It took more than 20 years to resolve the issue of KNP because during that period there was no road accessibility to Shimshal Valley, no communication service, and the literacy rate was also very low. During this time, Dr David Butz from Canada guided and helped the locals in protecting and securing their future by giving the idea of a 'nature trust' like SNT. Due to low literacy rate and unavailability of telecommunication facilities, the community had to resist in informal ways which had potential risks for the future of many youngsters. The youth, who were working in the SNT, used to walk for three days from Passu to Shimshal for meetings in harsh conditions. Due to such constraints, it took a very long time for the community to resolve this issue.

**Figure 5: Lack of Infrastructure & Connectivity**

*Source:* (L) Track to Shimshal in the early '90s (Hasan 2014). (R): Person crossing Shimshal River (Mock 2009).

## Co-management of Natural Resources: The Way Forward

The mode of conservation has begun to evolve over the last decades from complete exclusion of indigenous communities of protected areas to the development of new approaches intended at integrating them throughout the project cycle (Rodary et al. 2003). Local institutions and customary organisations are increasingly taken on board as entities capable of competently managing natural resources, due to their dependency and proximity to them. The concept of co-management has been an effort to bring the government and local communities together in the area of resource management. It was defined as sharing of power and responsibility between the government and local consumers (Berkes et al. 1991).

**Co-management is a pluralist approach for managing natural resources, integrating a variety of partners in a variety of roles, generally to the end goals of sustainable use of resources, equitable sharing of resources, related benefits and responsibilities and environmental conservation (Borrini-Feyerabend 2000). It is a situation in which two or more social actors negotiate, define and pledge amongst themselves a reasonable sharing of the management functions, entitlements and responsibilities for a given region or set of natural resources (Borrini-Feyerabend et al. 2007).**

## Mining Laws and Community Concerns

For the last one decade, Shimshalis, like other communities in Gilgit-Baltistan, have also been facing a new kind of challenge from neoliberal development practices, climate change, ecological disasters, displacement, and deprivation from their land and natural resources due to lopsided state policies on mining.

**The mining policy extended to Gilgit-Baltistan is a copy of other provinces of Pakistan without taking into account local sensitivities, interests and ecological concerns. The policy favours investors and extraction companies.**

The local mining department grants mining licence in a very questionable manner without fulfilling the bare minimum environmental criteria, Standard Operating Procedures and without the FPIC of the community.

**Mining companies and licensees try to enter the Shimshal using administrative force in violation of environmental and conservation laws and criteria.**

Given local wisdom, knowledge, and experiences, indigenous communities like Shimshal feel that mining will result in colossal damage not only to the ecosystem their survival depends on, but also harm their economic interests, social structure, values and culture. This is a high price that the community fears it will pay by engaging in mining practices.

Climate change has acquired a central place in policymaking and become a core issue not only for Pakistan but for the whole world. The Northern Areas and Gilgit-Baltistan have been witnessing worrisome abnormal changes in weather patterns, frequent disasters like Glacial Lake Outburst Flood (GLOF), unprecedented rain and snowfall due to overexploitation of resources and many other environment-related challenges.

Mining requires huge quantities of land destruction and digging deep at the river banks. By doing so, it results in erosion of the main settlement areas when rivers and tributary

streams swell up. It also results in destruction of the fragile ecosystem. It is difficult to enter any agreement for sampling or mineral extraction activities before addressing community concerns. Therefore, mining has been a source of conflict between the local people of Gilgit-Baltistan, the government, and the mining companies because the state grants mining rights to a company that includes access to and use of lands inhabited by local or indigenous communities. Most local communities are dependent on the land and water resources for their livelihoods and cultural identities. They are often excessively affected by mining.

**The mining concessions and agreements in Pakistan have typically involved only two parties: the government as the purported mineral owner, and companies as investors. Communities are not taken into confidence in these contracts which creates a sense of deprivation of their social, economic and environmental rights.**

The deprivation of these fundamental rights and dispossessing of land and resources leads to unemployment, poverty, low literacy, health issues and frustration among the youth who make up 64% of the total population. If the youth bulge is not handled carefully and seriously, they can become disenchanted, disenfranchised and may indulge in anti-social activities.

## Shimshalis' Resistance Strategies against Mining

In early 2018, the people of Shimshal came to know that a Chinese company, Yanda International, had applied for two leases through a local front man, one for an area of ten km² and the other for 263 km² in the Valley. The second company was Unique Friends which had applied for a total of three leases – two for exploration for 15 years and one for mining for 30 years.

These leases were given without taking the FPIC of the Shimshalis. The licensees had also obtained the 'no-objection certificate' (NOC) from the Gilgit-Baltistan Environmental Protection Agency (EPA) without fulfilling the environmental criteria and submitting the Intent of Environmental Examination (IEE) and Environmental Impact Assessment (EIA) reports of their projects to the relevant department.

When the Chinese licensees tried to start extraction work in Shimshal, the community resisted the move and did not allow the company, raising the following concerns and questions:

- Shimshal Valley is a community-managed conservation area. How did the mining companies obtain lease for commercial activities in a protected area?
- Why did the licensees not take FPIC of the community?

- How did the licensees obtain permission from the EPA, Gilgit-Baltistan Mining Department and Wildlife Department without submitting IEE and the EIA reports of the project?

In early 2018, the Yanda mining company's front man came to Shimshal Valley and informed the community about the 30-year lease for 263 km². The community was shocked when the mining company told them that they had already completed the licensing procedures and sampling and now they were almost ready to enter the operation phase. The community, SNT Board of Governors and the Advisory Committee took exception of this violation and infringement of community rights and started negotiations with the mining company.

The mining company offered 10% of the profit to the community to be invested on the development of road infrastructure used for the mining operations. The community anticipated that there would be no benefit for them in the proposed mining project, rather it would pose a potential threat to their source of livelihood, health and conservation efforts.

The community was mobilised by the SNT Board Members and its Advisory Committee. A series of meetings were held among the communities and Shimshali diaspora to find a viable solution to the imminent challenges. In March 2018, the SNT and its Advisory Committee came up with the idea to register a company under the SNT with membership of all community members.

**In April 2018, the SNT Board was able to get the Shimshal Natural Resources Management Company (SNRMC) registered with the Securities and Exchange Commission of Pakistan (SECP) under the Company Ordinance 2017 to manage and protect the collective natural resources and collective rights and well-being of the community from illegal exploitation.**

Most of the development in Shimshal, over the last few decades, has been done through philanthropic contribution and volunteer work, including the construction of irrigation channels, pony tracks, bridges, shelter homes, land development, environmental development activities and community institutions. Therefore, the Advisory Committee advised SNT members to gather historical documents and evidence that showed and strengthened the ownership rights of the community over Shimshal territory.

**Figure 6: Constructing Water Channel with No External or Government Support**

*Source:* Michaud and Michaud 1974.

The restructuring of community organisations, including SNT, reforming and updating its 20-year old management plan to make it compatible and adaptable to modern challenges and participation of educated and professional youth, especially ensuring gender balance in decision-making process and appointment on key positions was emphasised.

**It was agreed that there would never be any compromise on the community's rights, including ownership of land, resources and territory which would be defended, through all means and legal recourse, by approaching national and international human rights bodies and the media.**

On 11 May 2019, the SNT Advisory Committee held a meeting in Islamabad to discuss different strategies to draft a mining protocol for the SNRMC. It was decided that the Company would enter into an agreement or partnership on behalf of the community with any potential investor(s) as per the conditions and requirements of SNT's mining protocol. A similar protocol was developed for local community members who wanted to invest in or engage in any commercial activity in the collective lands and protected conservation areas (see Appendix 1 & 2).

The Shimshal territory is already entrusted in the name of SNT, registered under the Trust Act 1997. The SNT's management control over the fauna and flora and resources has been recognised by the Gilgit-Baltistan Government under a Collaborative Management Agreement signed between the two parties in 2008.

The Shimshalis, in support of their claims and mining protocol, referred to the international treaties, declarations and conventions ratified by Pakistan such as the:

- ILO Convention on Indigenous and Tribal Populations (Convention No. 107);[1]
- United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP);
- UN International Covenant on Civil and Political Rights;
- UN International Covenant on Economic, Social and Cultural Rights; and,
- Rio Declaration on environment and development.

**The community also referred to the core international human rights instruments, treaties and conventions signed and ratified by Pakistan which are not directly binding towards indigenous and tribal peoples, but provide a political basis for their struggle as well as practical guidance to the government and concerned institutions on indigenous and tribal peoples and their issues.**

While drafting the Mining Protocol for defending their rights over their natural resources and for the newly established resource management company, the community relied on and drew support from other treaties including the:

- International Covenant on Economic, Social and Cultural Rights (signed on 3 November 2004 and ratified on 17 April 2008);
- International Covenant on Civil and Political Rights (signed on 17 April 2008 and ratified on 23 June 2010); and,
- Biological Diversity Act, 2007 (Access to Biological Resources and Community Rights Act 2007).

The concerns of the Shimshalis were based on the following points:

1. The Shimshal territory is protected under the Trust Act, owned and governed by customary laws, centuries' old practices, collective wisdom and a community-managed conservation programme. Hence, the government departments or any individual from within or outside the community cannot interfere or violate these laws and practices.
2. According to EPA laws, international treaties and covenants, protection and conservation of social and cultural rights, and natural resources of indigenous people is the responsibility of signatory states of the UN. For any development or commercial ventures in a protected area, taking FPIC of the local community is a must. But, sadly, this was not done in the case of granting of lease for mining in Shimshal. So, the community raised pertinent questions to the Gilgit-Baltistan Mining Department as to why they provided lease to mining companies in a

[1] The implementation of the Convention, however, could not go beyond some service delivery in tribal areas.

conservation area and how did the EPA Gilgit provide NOC to the mining company without submitting IEE and EIA report of the project.

3. The community also raised objections on the mining criteria of Gilgit-Baltistan keeping in view the Consolidated Mines Rules, 1952; Pakistan Environmental Protection Act, 1997; and Gilgit-Baltistan Mining Concession Rules, 2014.

## Political and Constitutional Impasse

Gilgit-Baltistan is a disputed territory and linked to the Jammu and Kashmir conflict as declared by the Supreme Court of Pakistan in a landmark decision on 17 January 2019 (Hussnain 2019). The Court had also directed the Federal Government to prepare a comprehensive governance reform order within two weeks of the verdict for implementation in the region ensuring protection of the fundamental rights of the people of Gilgit-Baltistan (Bhatti 2019). Unfortunately, the government has failed to comply with the SCP judgement even after a lapse of over 18 months.

**The Gilgit-Baltistan Empowerment and Self-governance Order 2009 (Hussain 2009), and the Government of Gilgit-Baltistan Order 2018 ( Pamir Times 2018) and the 2019 modified Order (Hussnain 2019), are considered colonial instruments to deprive local people of their land, resources and other rights. These orders have been rejected by almost all nationalist and progressive political parties and community of Gilgit-Baltistan.**

The current Gilgit-Baltistan Legislative Assembly has very little power to make legislation on major issues like taxation, revenue, tourism, mining, water and power. These subjects fall in the domain of the Gilgit-Baltistan Council which is controlled by the Prime Minister as its Chairperson with four federal ministers as its members. Therefore, most of the political representatives have not been able to play any remarkable role in resolving such controversies.

The Forest and Wildlife Departments in Gilgit-Baltistan played a significant role in defusing conflict between the KNP and the Shimshal community during the '90s by organising frequent meetings with them and had an MoU signed with the community in 2008 that acknowledged and guaranteed the land use rights of Shimshalis. However, during the conflict on granting lease for mining, these departments failed to protect the rights of the people, rather they violated their own protocols and guidelines.

**There is a need for empowering the Gilgit-Baltistan Legislative Assembly to make a constitution for the region and reform and update customary laws in conformity with modern needs and to protect the rights of the people.**

**Figure 7: Love for their Land**


*Source:* (L) Marvi Somoro and Sarah Gandapur (Gandapur 2019). (R) Sajjad Saka (Saka 2017).
*Note:* These pictures are an illustration of the emotional attachment of the community with their land. Junior scouts can be seen in the picture following their customary volunteerism values.

## Recommendations for Conservation and Mining of Indigenous Lands

### *Conservation*

The following recommendations should be kept in mind when developing conservation strategies for territories and resources of indigenous and local communities:

1. Reforms should be integrated in national conservation policies to ensure the rights of the indigenous communities and protect the natural ecology and biodiversity.
2. The conservation projects and policies should be research-based and keep in mind the importance of adaptation to climate change.
3. Free, prior and informed consent of the community should be taken before designing conservation projects.
4. Keeping in view the customary laws, rights, land rights and international declarations regarding indigenous communities, community-based conservation and co-management systems should be utilised to mitigate conflicts over natural resources.
5. Co-management should be used as a tool to resolve conflicts related to development and conservation.
6. The degree of power sharing in co-management should be clearly defined to avoid future conflicts and it must be specific in terms of linked authority, responsibility and structure that address equality and equity concerns in negotiations.
7. The communities should be taken on board during monitoring and evaluation of all projects.

### *Mining*

#### *Indigenous Community Mining Protocol: A Vision for New Green Development, Right to Land, Resources, and Empowerment*

Development and environment are major sources of concern for marginalised communities like Shimshalis whose lives are intimately tied to the fate of their local common property resources.

**Indigenous communities in Pakistan are facing major challenges in striking a balance between managing local common property resources, protecting the environment and initiating development activities.**

These recommendations have been prepared in accordance with international, national and customary laws on economic, social, environmental and cultural rights of

indigenous people, based on historical and geographical facts, as well as ecological, and economic concerns of the indigenous communities.

**The right to participate meaningfully in natural resource management, to protect their land from environmental threats, and their FPIC before making any decision for development projects is recognised by the UN (OHCHR 2019).**

### *Mining Resource and its Benefits: Community Partnership*

The indigenous communities will enter into an agreement with any interested company or individuals after they agree on or meet the following terms and conditions:

No mining entity/investor(s) - local, national or international - can be allowed to start mining operations in the indigenous settlement areas unless it signs a partnership agreement with community-based conservation / representative organisations on behalf of every household of the relevant communities. If the same is not undertaken, communities may seek to block project development, choose not to work, and projects may be subject to legal challenge, even after regulatory permits have been obtained, potentially halting progress (see Appendix 1 & 2 for details).

## Conclusion

There are vital gaps in the conservation and mining policies of Pakistan which completely exclude local communities in decision-making for the utilisation of their natural resources. The failure to involve local people and others interested or affected parties in a conservation planning or management creates social tension in various regions, especially those in the Northern Areas.

**If state policies remain the same, they will deprive indigenous communities of their livelihoods and this social tension will become a security threat for the nation. The concept of 'co-management' should be welcomed by the government to create a peaceful and prosperous environment in the country.**

The free, prior informed consent (FPIC) of the communities should be taken before making any decision about their natural resources keeping in view the environmental sensitivity of the areas, customary laws and international regulations regarding indigenous communities of which Pakistan is a signatory (OHCHR 2019).

How can sustainable development be achieved in a digital age if national policies are in favour of a few 'elite' people and companies only?

Pakistan's policies should be research-based and participatory. There has been considerable impact of the small communication services, road accessibility and literacy projects initiated by the government for resolving community conflicts. If the government further improves these services and provides quality education, healthcare and includes communities in managing their resources, Pakistan would be able to achieve the Sustainable Development Goals.

It is the obligation of the Federal Government to safeguard the rights of indigenous people over the natural resources of their areas and help them in every walk of life to build resilience against climate change and other environmental crisis.

**The Office of the United Nations High Commissioner for Human Rights on 8 July 2019 also urged the Government of Pakistan to ensure that the indigenous and local communities of Gilgit-Baltistan are consulted and give their informed consent for the use of their land or natural resources for any kind of non-local business activities.**

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## Appendix 1

## Phase I: Pre-conditions for Obtaining Mining License/Lease

1. Obtaining Free Prior and Informed Consent (FPIC) of the communities by explaining the project's environmental, economic and legal aspects before applying for any lease by any local, national and international investor, or company.
2. Before entering into any formal agreement the intending company will have to comply with intent of environmental examination and Environmental Impact Assessment (EIA) criteria as per Pakistan Environmental Protection Act (PEPA).
3. The mining company and community representative organisations will jointly carry out baseline survey/study on the Environmental Impact Assessment (EIA) of the project area.
4. Develop social, economic and environmental impact and mitigation plan.

5. The community organisations' representatives should be part of the selection of the minerals and environmental assessors to ensure neutrality.
6. Conduct full assessment of the project's risks and benefits and share its results with the community.
7. Prepare cost and organise actions to mitigate each risk.
8. The mining company and community organisation should jointly carry out a study to assess the estimated deposit of the primary mineral or metal for which application has been submitted; and,

    a) The secondary minerals and metals;
    b) Their estimated worth in international market.
    c) The company will have to provide a substantial amount towards an endowment for health education, medical treatment, care and attention at acceptable standards to all inhabitants of the communities.

9. The interested party to bear the survey cost.
10. Any lease issued for any sort of mineral or metal extraction by the department concerned without ensuring that the applicant has obtained the Initial Environmental Examination (EIA) certificates, FPIC of the community has no legal standing.
11. No investor or company should be allowed to use communication infrastructure of the community unless and until the company widens, improves, carpets or realigns the existing road and bridges and ensures profit sharing in monetary form with 51:49, in which the community will receive 51% monetary profit on the basis of ownership of its territory.
12. The Community-Based Organisation (CBO), which is the custodian of the territory and its resources on behalf and for the community, reserves the right to stop any activity which it believes is not in the best interest of the community.

## Phase II: Engagement Principles

After completion of Phase I, the company and the community will engage in negotiation, and enter into agreement on the following terms and conditions:

1. Recognising community's ownership rights of the land and its resources.
2. Arrangements of institutional and financial steps that assure the project's benefits are transparently allocated to the people.
3. Distribution arrangements focused on a common community endeavour.
4. Formalisation of negotiated arrangements with legally binding instruments.
5. Recognising royalties of mining resources of the community.
6. Fair compensation of land and built-up property.

7. Profit sharing in monetary form with 51:49, in which the community will receive 51% monetary profit on the basis of ownership of its territory.
8. Local community members should be preferred for employment.
9. Before fixing wages for the employees, it should be negotiated with the community's representative organisation.
10. Through partnership, the community would expect to positively influence the development and sustainability in improving / maintaining community infrastructure.
11. The company should contribute towards the improvement of living standards of the people; create sustainable outcomes for long-term community survival as well as to its own corporate benefits.
12. With the benefits coming from mutual collaborations, the community organisation should address key social issues such as the alleviation of poverty by means of providing employment, education and business development initiatives through negotiating this mutually beneficial agreement.
13. Mining companies should arrange technical training programmes aimed at increasing access to jobs for the community
14. Support local enterprise and businesses.
15. Create social programmes and strategies aimed at the maintenance and promotion of culture.
16. Mining companies should contribute towards the improvement of health and well-being of the community.

## Benefits to the Company

By signing the agreement, the company will gain a number of benefits by developing durable relationships with local community:

1. It will enhance the industry's sustainable development credentials.
2. Ensure security of tenure.
3. The mining company will be able to smoothly continue their business functions on the basis of their legal agreements with the government and community.
4. Proper agreements will build trust between the mining company and the community which would be helpful for long-term projects.
5. It will define business agreements, relationships and rights of parties.
6. Help to prevent misunderstandings or disputes by making the agreement clear from the beginning.
7. Avoid the risk of a dispute regarding payments, responsibilities, and timeframes to the services are to be performed under the contract.
8. It will set criteria for resolving conflicts and misunderstandings.
9. It will help in preventing misinterpretation of commitments.
10. It will ensure better management of business relationships.

11. It will help resolve disputes through mediation, arbitration or a court in a particular jurisdiction.
12. It will reduce the risk of conflicts if any party ends the contract before the work is completed.

Working Paper

# Preserving and Promoting Endangered Languages of Northern Pakistan in a Digital Age

*Zubair Torwali*
Community Activist,
Educator & Founder,
Idara Baraye Taleem-o-Taraqi,
Swat, Pakistan

**Abstract**

Indigenous communities living in the mountainous terrain and valleys in Northern Pakistan, Gilgit-Baltistan and upper Khyber Pakhtunkhwa, speak over 30 languages. Some of the known and spoken indigenous languages include Khowar, Shina, Indus Kohistani, Torwali, Gawri, Palula, Kalasha, Dameli, Gawar-bati, Bateri, Chilloso, Dumaki, Brushaski, Ushojo, Balti, Wakhi, Yidgha, amongst others. These languages are considered 'endangered' because of challenges like lack of political organisation, marred identities, no written tradition, marginalisation, globalisation, impact of dominant languages, rough geographical terrain, and poverty.

Notwithstanding the challenges, there are a few positive initiatives carried out by community members focused on documenting and transmitting these languages and their cultures for future generations; and trying to make them relevant in a pedagogical setting. This study highlights the challenges faced by these communities and looks at initiatives for the documentation, preservation and promotion of their languages in a globalised digital age.

## Introduction

According to an estimate by the *Ethnologue* (SIL International, n.d.), there are 77 languages spoken in Pakistan as mother tongues. The number of speakers of these languages varies from a few hundred to millions. Glottolog 3.4 (Hammarström et al. n.d.) counts 83. If one clubs the varied dialects of *Pashto*, *Koli*, *Balochi* and *Hindko* from the database of *Ethnologue*, 66 languages are spoken in Pakistan. Out of these, more than 25 languages are spoken in Northern Pakistan. This chapter categorises upper Khyber Pakhtunkhwa and the Gilgit-Baltistan as 'Northern Pakistan' and provides a brief introduction of the languages spoken in this collective region. It focuses on the least known languages and excludes *Hindko* and *Pashto* as they are well-known to many Pakistanis. The languages this chapter is briefly taking into consideration (in alphabetical order) include:

**Badeshi, Balti, Bateri, Burushaski, Chilisso, Dameli, Domaaki, Eastern Kativiri, Gawarbati, Gawri, Gojri, Gowro, Kalasha, Kalkoti, Kamviri or Shekhani, Khowar, Kohistani, Madaghlashti, Mankiyali, Palula, Shina, Torwali, Ushojo, Wakhi and Yidgha.**

A brief note about each language will be of help for readers interested in the linguistic diversity of the northern parts of Pakistan. A few of these languages are also spoken in Pakistan's neighbouring countries such as Afghanistan, India, Tajikistan and China. All these languages are categorised as 'endangered' in the *Encyclopaedia of World's Endangered Languages* (2007) edited by Christopher Moseley (Driem 2007). Many of them are *'severely endangered'*, whereas a few are *'moribund'* or already *'extinct.'* The exact number of speakers of any of these languages is not known because none of them has ever been included in any national census in Pakistan. However, some estimates from research and information gathered from locals is helpful. The study concludes with causes of the attrition of these languages and recommendations for their inclusion in education and literacy.

## Background of Study

In early May 2019, scholars, writers and activists from the mountain communities of Northern Pakistan gathered in Bahrain, Swat, which is at a distance of 65 km to the north of Mingora, the headquarter of District Swat. The gathering was an attempt to deliberate on the challenges being faced in the sociocultural, socioeconomic and socio-political spheres around regional languages. It aimed at finding ways to address the challenges of modernity; and internal and external colonisation. The one-day gathering was organised by Idara Baraye Taleem-o-Taraqi (IBT), in collaboration with the University of Sydney, Australia.

A number of factors, pertaining to the marginalisation of various indigenous communities, were discussed. Among them 'exclusion of the languages of these communities from spheres of state education and media' came out as one of the most fatal threats to the rich cultural heritage of these communes. It was felt that with the attrition of their languages, these communes would lose their identity, history, literature (which is mostly in oral form or oralture) and indigenous knowledge.

The gathering was unique in many ways. The scholars, writers and activists resolved to carry out a number of initiatives in order to address these challenges. They did not lament on the apathy of the State towards their heritage, rather expressed their determination in doing whatever they could for their heritage and social development. The multiplicity of issues and insight by the participants was published in various news articles in 2019.[1] This chapter is devoted to offering more detailed analysis of the languages spoken in Northern Pakistan highlighting linguistic diversity of the country for readers within the country and abroad.

## Linguistic Diversity of Pakistan

The areas where majority of the endangered languages are spoken comprise of the mountainous northern parts of Khyber Pakhtunkhwa and Gilgit-Baltistan.

In **Chitral**, 12 languages are spoken (Decker 2004). These are *Khowar, Kalasha, Dameli, Palula (Phalura), Gawar-bati, Yidgha, Shekhani, Eastern Kativiri, Madaglashti Persian, Gujari, Wakhi* and *Pashto*. Khowar is the dominant language in Chitral, whereas the Kalash community is the single indigenous community which is a religious minority as well.

In the **Swat Valley**, indigenous languages include *Torwali, Gawri, Ushojo* and *Gujari*. *Pashto* is the dominant language in Swat. *Torwali* and *Gawri* are said to be the ancient indigenous languages of Swat, which can be traced back to the pre-Muslim era in the Valley (Torwali 2015a).

In **Indus-Kohistan**, there are five indigenous languages spoken, in addition to *Gujari* and *Pashto*. These languages are *Kohistani, Shina, Chilliso, Gowro* and *Bateri* (Hallberg 2002). *Shina* and *Kohistani* are the major languages.

[1] Abridged versions of this chapter have been published by The Criterion Quarterly 2019, 'The Languages of Northern Pakistan', 26 December, <http://www.criterion-quarterly.com/languages-northern-pakistan/>; The News International 2019, 'The Languages of Northern Pakistan', 7 July, <https://www.thenews.com.pk/tns/detail/568074-languages-northern-pakistan>; and Dawn 2019, 'Remember the Dying Languages of Northern Pakistan', 28 June, <https://www.dawn.com/news/1489343>.

In **Upper Dir**, adjacent to Chitral and Swat, *Gawri* is spoken along with the moribund language *Kalkoti*. The dominant language is *Pashto*.

In present day **Gilgit-Baltistan**, *Shina*, *Brushaski, Balti, Wakhi, Khowar* and *Domaki* are spoken (Backstrom and Radloff 2002).

All these languages excluding *Wakhi, Yidgha, Balti* and *Brushaski* are Indo-Aryan languages. They have further been classified as *Dardic* by a number of writers, notably by the famous orientalist and educationist, Gottlieb Wilhelm Leitner in his original works published in 1877, 1880, 1866, 1886 and 1893 (Leitner 1978).

*Yidgha*, *Madaglashti* and *Wakhi* are Indo-Iranian, whereas *Balti* is a Tibetan language. Linguists classify *Brushaski* as a 'language isolate', which means that this language does not go with any major language family (Ibid.). *Gujari* and *Hindko* are Indo-Aryan, but not in the sub-family *Dardic*.

*Hindko* is spoken in Peshawar, Kohat and in the Hazara division, especially in the districts of Abbottabad and Mansehra. It is the second major language in Khyber Pakhtunkhwa. In these districts, it is the dominant language. *Gujari* or *Gojri* is the language of Gujar communities living in Northern and Southern Pakistan (Ethnologue 2002). In Swat and other upper parts of Khyber Pakhtunkhwa, *Gujari* is also spoken by communities now settled in some villages over the hills. In Mansehra district, a minor language, *Mankiyali*, also locally known as *Trawara* (Anjum and Rehman 2015) is spoken by a small community of a few hundreds. The language is Indo-Aryan Dardic and is also critically endangered.

**In Pakistan, the number of people speaking each of these languages is not estimated correctly because these communities do not have a separate counting column in the Population Census. Their populations vary from a few hundred to thousands to a million in a few instances.**

## Dilemma of Endangered Languages in Pakistan

**None of Pakistan's governments or universities has ever taken any initiative of profiling the languages spoken by the people of the country. Only a few of them - *Urdu, Pashto, Punjabi, Balochi, Sindhi and Saraiki* - are mentioned in the media, teaching materials and in any kind of national database.**

According to *Ethnologue*, an informative compendium of the languages of the world, Pakistan has 77 spoken languages. This database is maintained by an international organisation called the Summer Institute of Linguistics or SIL International.

**Attempts at profiling the languages of Pakistan have been undertaken by foreign researchers either associated with the colonial British government or with international organisations.**

The Irish linguist and language scholar, who also served in the Indian Civil Services, Sir George Abraham Grierson (d. 1941), did a remarkable survey of about 364 languages and dialects of India and published his work in 11 volumes. His work expanded over 30 years and is titled *Linguistic Survey of India* published from 1903-1928. This Survey also contains information about some of the languages spoken in the mountainous region of what is now Pakistan.

Before Grierson, Leitner did some linguistic and anthropological work on the languages and people of these areas in a book called *The Languages and Races of Dardistan* (1877). Following Leitner, another officer in the then-British Army, John Biddulph, published his work on the languages and people of these areas in a volume called *Tribes of Hindoo Koosh* (1880). Since then, a number of notable linguists and anthropologists such Georg Morgenstierne, Karl Jettmar, D.L.R. Lorimer, Frederik Barth, Colin Masica, Richard Strand and many others have studied the languages and cultures of Northern Pakistan and Afghanistan.

A systematic survey of the languages of Northern Pakistan was, however, started in the 1980s. The Survey was started in 1986 by SIL International under the auspices of the Ministry of Culture, through the National Institute of Folk Heritage, *Lok Virsa*. The National Institute of Pakistan Studies (NIPS), Quaid-i-Azam University, Islamabad, facilitated and supported the research. The Survey was jointly published in five volumes by both partners in 1992. Titled *Sociolinguistic Survey of Northern Pakistan*, it covered 25 languages of Northern Pakistan including *Pashto, Hindko, Ormuri* and *Waneci*. This Survey was an improvement on Grierson's *Linguistic Survey of India*'s part of this region, according to its Preface: 'At a macro level, this work is definitely an improvement over Grierson's *Linguistic Survey of India* and the subsequent studies by various scholars (Backstrom and Radloff 1992).

## Language Endangerment: Some Definitions

Christopher Mosely defines five levels of language endangerment: potentially endangered, endangered, severely endangered, moribund and extinct. He counts a number of factors against each level.

A language is **'potentially endangered'** if it lacks prestige in the home country; its speakers suffer from economic deprivation; it is under pressure from a larger language in the public sphere and the language is not being systematically passed on in the education system.

A language is **'endangered'** when its speakers are adults and it is not passed on to the children, especially in schools as well as in the home environment.

Moseley describes a **'severely endangered language'** as one with speakers only in the elderly people aged above 50 which has lost its prestige and social value over a generation ago.

A **'moribund language'** is that language which is spoken by a very tiny elderly ethnic group; whereas an **'extinct language'** is one which has no speakers left and its existence is only remembered by people in the community; and perhaps, there is at least a faint possibility of its revival (Moseley 2007).

According to *Ethnologue*,[2] there are around 7,106 languages currently spoken in the world.

**Linguists estimate that by the end of this century, more than half of these 7,000 plus spoken languages will become extinct resulting in loss of valuable scientific and cultural information.**

UNESCO's *Atlas of the World's Languages in Danger* categorises 2,473 languages into five levels of endangerment:

1. Vulnerable - not spoken by children outside the home.
2. Definitely Endangered - children no longer learn the language as a mother tongue in the home.
3. Severely Endangered - language is spoken by grandparents and older generations, while the parent generation may understand it, they do not speak it to children or among themselves.
4. Critically Endangered - the youngest speakers are grandparents and older, and they speak the language partially and infrequently; and
5. Extinct (Moseley 2010).

## Pakistan and Its Rich *yet endangered* Indigenous Language Portfolio

Almost all the indigenous languages spoken in Northern Pakistan are endangered. Some of them, for instance, *Bateri, Chilliso, Ushojo, Kalkoti, Mankiyali* (*Trawara*) or *Domaki* are under the category of 'critically endangered' languages; whereas languages like *Shina, Torwali, Khowar, Gawri, Kohistani*, etc., are in the category of 'definitely

[2] *Ethnologue: Languages of the World* is a web-based publication that contains statistics for 7,106 languages and dialects in the 17th edition, released in 2013. Up until the 16th edition in 2009, the publication was a printed volume.

endangered' languages. *Gujari, Hindko* and even *Punjabi* are also endangered even though the number of speakers of these languages are in millions. One language, *Badeshi*, which was spoken in the Chail Valley in upper Swat, is extinct now.

***Badeshi*:** It 'was' an Indo-Iranian language spoken by a few hundred people in a far-away village in the Chail Valley to the east of the Madyan town in Swat. In 2018, BBC Urdu reported that the language had only three speakers alive. In reality, even those three elderly people could not speak this language. It is already extinct.

***Balti:*** *Balti* is a Tibetan language spoken by the Balti people in the four districts - Skardu, Shigar, Granche and Kharmang - of the Baltistan division of Gilgit-Baltistan region. There are, however, some small villages in the valleys of Kharmang, Rondu and Skardu where the major language of Gilgit-Baltistan, *Shina*, is spoken, too. *Balti* is the second largest language of Gilgit-Baltistan after *Shina*. According to BBC Urdu (2017), the estimated number of its speakers is about 350,000 in Pakistan.

***Bateri:*** *Bateri* is a *Dardic* language spoken by people living in the area of Batera on the east bank of the Indus River in the Lower Kohistan district in Khyber Pakhtunkhwa. This area is in the southern-most part of the Kohistan region, to the north of and across the river from the Pashto-speaking town of Besham. According to estimates, the number of speakers of *Bateri* language is about 22,000 (Frawley 2003).

***Burushaski:*** It is the single 'language isolate' in Pakistan as it has not been classified under any of the major or sub-groups of languages. It is not related to its neighbouring languages, *Dardic* or *Persian*. It is spoken in the districts of Hunza, Nagar and in the Yasin Valley in the Ghizer district of Gilgit-Baltistan. According to the *Burushaski Language Documentation Project*, the number of its speakers in the aforementioned areas is about 100,000 (Munshi 2015).

***Chilisso:*** This is a *Dardic* language which is now 'moribund.' It is spoken in scattered villages in the right bank of the Indus River in the midst of the majority *Shina*-speaking population in eastern side of the Kohistan districts in Khyber Pakhtunkhwa. The locals of Kohistan do not use it. However, according to various sources, for example, Frawley (2003), about 1,600 speak this language.

***Dameli:*** *Dameli* is again a *Dardic* language spoken in the Damel Valley which is situated between Drosh and Arandu, about 20 km south of Drosh in Southern Chitral in Khyber Pakhtunkhwa. A 2013 research on its grammar estimated the number of its speakers at 5,000 (Perder 2013).

***Domaki:*** *Domaki* is a language spoken by a small community living in the scattered villages in Hunza, especially in Mominabad. Another name for this language is *Bariski* and its total speaking population was estimated in 2005 at about 854 in Mominabad

(Janjua 2005). The people have recently renamed it as *Dawoodi*. It is also severely endangered.

***Eastern Kativiri:*** *Eastern Kativiri* a Nuristani language. In Pakistan, it is spoken in Lutkuh Valley and by some people in Bumboret, Rumbur and Urtsun of the Chitral district in Khyber Pakhtunkhwa.

***Gawarbati:*** *Gawarbati* is another *Dardic* language spoken by the people living along the Chitral River, predominantly in the Afghanistan-Pakistan border area near the village of Arandu in the Chitral district in Khyber Pakhtunkhwa. In Pakistan, the number of its speakers is said to be about 2,000. It is also spoken across the border in Afghanistan.

***Gawri:*** *Gawri* is another Dardic language spoken in the hilly villages in the districts of Swat and in the district Upper Dir. The most famous tourist destinations, Kalam in Swat and Kumrat in Upper Dir, are owned by people speaking this language. In Swat, the main Gawri villages are Kalam, Utror, Mititan and Ushu; whereas in upper Dir, the villages where the Gawri people are in majority are Thal, Lamuti, Biar and Birikot in the Kalkot Tehsil also referred to as Dir Kohistan or Kohistan of Dir. The total number of speakers of the Gawri language in both Swat and upper Dir exceeds 100,000 (Sagar 2018).

***Gojri:*** *Gojri* is the language spoken by the nomadic Gujjars in various parts of Pakistan. It is also spoken in scattered villages in Gilgit-Baltistan, Chitral, Dir and in Swat. It is a widely scattered language in Northern Pakistan and no estimate of its speakers is available.

***Gowro:*** The *Gowro* is believed to be the language of the Gabar Khel clan living scattered in some of the villages in the eastern Kohistan region in Khyber Pakhtunkhwa. It is also a moribund *Dardic* language. *Gowro* should not be confused with the language *Gawri* spoken in Upper Swat and in Upper Dir district. The current status of this language is not known as many locals in Indus Kohistan claim that it is no longer spoken. However, researchers have asserted that it was spoken by about 200 people (Frawley 2003, p. 197).

***Kalasha:*** Many people in Pakistan are well aware of the unique Kalash people living in three valleys in Chitral. *Kalasha* is the language of these people and is a *Dardic* language. The Kalasha are concentrated in several small valleys on the west side of the Chitral River south of Chitral town; in the Rumbur, Bumboret, Birir and Urstun Valleys of district Chitral in Khyber Pakhtunkhwa. It is also known as *Kalashamon* and about 3000-5000 people speak it (Petersen 2016, p.10).

***Kalkoti:*** *Kalkoti* is a severely endangered *Dardic* language spoken by a small number of people in the village, Kalkot, in the tehsil Kalkot, and in Upper Dir district in Khyber Pakhtunkhwa. The number of its speakers is said to be about 6000 (Liljegren 2013, p. 129).

***Kamviri* or *Shekhani:*** *Shekhani* is a term used by most people in Chitral for both Eastern *Kativiri* and *Kamviri* speakers. *Shekhani* means 'the language of the sheikhs, or converts'. It is spoken by a small population in the Langorbat and Badrugal villages in Chitral in Khyber Pakhtunkhwa.

***Khowar:*** *Khowar* is the major language spoken in Chitral. It is perhaps the second largest *Dardic* language in Pakistan. Majority of the people in Chitral speak *Khowar*. It is also spoken in certain villages and valleys in the Ghizer district of Gilgit-Baltistan. The estimated number of *Khowar* speakers in all regions in Pakistan is about half a million (University of Chitral 2018).

***Kohistani:*** *Kohistani* is one of the major *Dardic* languages that is spoken mainly on the west bank of the Indus River in the Kohistan region of Khyber Pakhtunkhwa, including the Kandhia Valley adjacent to Diamer district of Gilgit-Baltistan. Some ancient writers named this language as *Maiya* or *Shuthun*. It is also known as *Indus Kohistani*. The estimated number of its speakers is about 250,000 dwelling on the western bank and valleys in the Kohistan region (Jan n.d.).

***Madaghlashti:*** *Madaghlashti* or *Madakhlashti* is an Iranian language spoken by a small population in the Madakhlast village in the Shishi Koh Valley in Chitral, Khyber Pakhtunkhwa.

***Mankiyali:*** *Mankiyali* is an endangered *Dardic* language spoken by a few hundred people in the Danna village in Mansehra district in Khyber Pakhtunkhwa. The language was added to *Ethnologue* in 2018. It is spoken by about 500 individuals (Anjum 2016).

***Palula:*** *Palula* is a *Dardic* language spoken by a small population in a number of villages on the east side of the Chitral Valley near Drosh in southern Chitral. Ashret, located on the main road between Dir and Chitral, just below the Lowari top on the Chitral side, is the main village of Palula people. Another valley above Ashret is Biori where *Palula* is spoken. It is spoken by approximately 10,000 people (Liljegren 2019).

***Shina:*** *Shina* is the largest *Dardic* language alive today. It has multiple dialects and variations. It is a major language of Gilgit-Baltistan. Among all the Dardic languages, there is significant literature on *Shina*. It is spoken in Gilgit city, Puniyal, in villages of Ghizer district, in Shinaki area connected to Hunza, and in Astor and in Diamer districts of Gilgit-Baltistan. It is also spoken in Easter Kohistan region, on eastern side

of the River Indus in Kohistan area, in Khyber Pakhtunkhwa. Approximately 500,000 people speak *Shina* language in Pakistan (Mumtaz et al. 2019).

***Torwali:*** The speakers of *Dardic* language, *Torwali*, live in the main Swat Valley as well as in one of its tributaries, Chail Valley. These two valleys join at Madyan, a *Pashto*-speaking town just eight km below Bahrain, which is the business and political centre of the Torwali people. Towards the north, *Torwali*, is spoken up to Asret, although some houses of Torwali people are in Laikot, Peshaml and in Aryanai near Kalam. A recent study showed that it is spoken by about 120,000 people (Torwali 2019, p. 44).

***Ushojo:*** With a small number of speakers, this severely endangered *Dardic* language is spoken in the villages of Kas, Kardial, Bishigram, Tangai Banda and other smaller hamlets in the Chail Valley to the east of Madyan town in Swat. Each *Ushojo* village has *Torwali* speakers living in it and Bishigram also has speakers of *Pashto* living there. It is spoken by about 2000 people.

***Wakhi:*** *Wakhi* is an Iranian language. In Pakistan, it is mainly spoken in Gojal, Hunza in Gilgit-Baltistan region. However, a small number of *Wakhi* speaking people also live in Yasin Valley in the Ghizer district of Gilgit-Baltistan. It is also spoken by a small population in the Yarkhun Valley of Chitral, where a majority of them live in the Baroghil area in Chitral, Khyber Pakhtunkhwa. The total number of speakers of *Wakhi* language in all countries (Pakistan, China, Afghanistan and Tajikistan) was estimated at 65,000 (Malik 2013).

***Yidgha:*** *Yidgha* is also an Iranian language. In Pakistan, it is mainly spoken in the Luktkuh Valley of western Chitral, Khyber Pakhtunkhwa. There are probably 15 villages of the *Yidgha* speakers in the Luktkuh tehsil between Garam Chashma and Darosh pass in Chitral. The estimated number of speakers of *Yidgha* in Chitral is about 6,150 (University of Chitral 2018).

**Almost all these languages are facing increasing pressure due to cultural globalisation, and internal and external colonisation. The 'dominant' languages in the region like *Pashto* and *Urdu* along with the language of globalisation, *English*, are replacing these languages from the domains of education and media.**

Majority of these languages are still in *'speech'* form, i.e., they do not have a writing culture. Because of language attrition, the scientific and literary world will lose the repertoires of indigenous knowledge and wisdom that are of great importance for the communities linked to these languages.

On the other hand, if these languages are left to their fate, the communities who use them as native languages, and have been using them for social interaction and as

semiotics of their *Weltanschauung* are sure to lose their past memory, history, and identity; and thus, be exposed to manifold vulnerabilities such as loss of self-esteem; crises of belonging and identity; and loss of their imagination, so intrinsically embedded in the languages they learn in their communities.

**The Northern Areas are a beautiful blend of multilingualism where people of one community understand the language(s) of the other community or communities. This multilingualism resists any force which threatens to break the harmony these communities have and consequently, covers the lacunae which would otherwise be filled by forces that may harm the matrix of co-existence and cultural harmony.**

There is an urgent need to awaken these sleeping languages and revitalise them using modern means and tools. The foremost step needed is to build literacy in these languages because it is the written media that not only keeps a language vital, but also enhances its prestige. As the Latin proverb goes *Verba Volant, Scripta Manent* [Spoken words fly away, Written words remain], these languages are now *Verba Volant* and are soon going to be *Volant* [extinct] if they are not *Scripta* [written].

## Endangered Languages of Pakistan: Causes & Challenges

These languages are endangered because of a number of challenges:

### *Lack of a Writing System*

These languages do not have 'widely'[3] used scripts. The working scripts some of the speakers possess are based on Arabic. Orthographies in these languages have recently been developed with SIL's technical support. However, none of these languages had a writing tradition before the beginning of the third millennium except *Khowar, Hindko, Gojri* and *Shina* wherein a number of writers and poets tried to write their works following the Arabic script.

For some languages, for instance, *Balti*, *Tibetan Balti* script (Kazmi n.d.) is used. For *Kalasha*, some people use Romanised script in addition to the Arabic one (Trail and Cooper 1999) and (Cooper 2005). Many local people used Cyrillic-based script for the *Wakhi* language. Having been without working orthographies, no written literature of renown exists in these languages. The old poets of *Shina* and *Khowar* wrote their works

[3] Although scripts have been designed for *Khowar*, *Shina*, *Indus Kohistani*, *Torwali*, *Gawri*, *Brushaski* and *Palula*, these are not widely used within the respective communities. Among these languages, especially *Torwali*, *Gawri* and *Palula*, *Indus Kohistani*, and *Khowar*, the situation has improved since 2008 because of early childhood education initiatives undertaken in these communities with the support of SIL and Forum for Language Initiative (FLI).

using *Urdu* alphabets only. *Urdu* literacy among people compelled writers and poets to use *Urdu* alphabets even for the special phonemes these languages have.

## *No Recognition by the State*

**These languages are not recognised by the Government of Pakistan for usage in schools as mediums of instruction or subjects. Neither are they recognised as national languages of Pakistan. Pakistan's Constitution does not recognise any indigenous group in the country.**

In 2012, the then-provincial government in the north-western province, Khyber Pakhtunkhwa, however, made a law wherein four languages, i.e., *Saraiki, Khowar, Hindko* and *Indus Kohistani* were allowed to be gradually used in pre-primary schooling in places where these languages are mother languages of majority of the children, whereas *Pashto*, the dominant language in the province, was made a compulsory subject in primary grades in areas where it is the language of the majority (ICG 2014). This law is known as the 'Khyber Pakhtunkhwa Promotion of Regional Languages Authority Act, 2012'. It was passed by the government in power at the time and the succeeding government in the province has not taken the initiative any further. Hence, the establishment of the authority is still in a state of limbo.

## *Poverty and Marginalisation*

The communities who speak most of these endangered languages are predominantly poor, illiterate and underdeveloped. Literacy, among the Ismailia sect of the *Burushashki*, *Wakhi*, *Shina* and *Khowar* speakers in Gilgit-Baltistan and upper Chitral, however, is higher compared to the other Dardic communities. However, given scarce job opportunities, many youth from these communities migrate to cities and their languages and culture come under pressure. In cities, children no longer learn their native languages.

**The mountainous communities are marginalised in terms of human development and infrastructure. Despite being the custodians of the country's rich natural resources in the form of forests, biodiversity and water, they lag far behind in the Human Development Index. This has triggered large-scale migration from these areas.**

Many members of these communities have permanently settled in cities like Karachi, Hyderabad, Peshawar, Lahore, Rawalpindi and Islamabad. For instance, over 30% (Torwali 2015b) of the total population of the Torwali community of Upper Swat has permanently settled in Karachi, Quetta, Hyderabad, Peshawar, Nowshera,

Rawalpindi, Lahore and other cities. This has further threatened the languages and culture of these communities.

In addition to this, people flee the rough and long winter in the mountains and spend it in the plains of Pakistan. As winter begins, about 80% (ICIMOD n.d.) of the *Gawri* and *Gujar* communities of Upper Swat migrate to the plains of Khyber Pakhtunkhwa and Punjab. They spend three to five months there at the cost of education of their children. Besides winter, the major causes of this permanent and seasonal migration are lack of essentials for sustenance such as fuel, health facilities and roads in these areas. Being overwhelmingly dependent on scarce agriculture and livestock, these communities do not live a privileged life.

## *A Marred Identity*

Since state education in Pakistan usually discourages lessons on cultural diversity of society in course books; and since these communities have no effective political say in the country, therefore, majority ordinary educated Pakistanis do not know about the indigenous identity of these communes. As successive invaders dismantled their centres of power over the past five centuries, these communities have lost the sense and memory of their unique identity. Resultantly, majority of them suffer a marred identity which is very often an 'ascribed-discursive identity' (Gee 2001). This is the reason that majority of these communities relate themselves with Arabs or the dominating communities they live with.

**Moreover, globalisation has also posed critical questions of identity and identity construction. It is an intricate issue especially in the context of rapidly imposed external change. Given the complexity of identity construction and the modern tools that shape and accelerate it, these ethnic minorities are the worst victims of marred identities.**

## *Onslaught of Globalisation - Cultural and Religious*

Globalisation has affected every community in Pakistan, whether large or small. But, its impacts have been fatal on the already suppressed communities, their languages and culture. Majority of them have now begun to regard their languages and culture as hurdles in the way to development. This is the reason why many of them shift not only their culture, but also language when they adopt new ways to progress. The most pertinent example of this is the threatened Kalasha community, the single Dardic community in Pakistan, which has so far retained its unique indigenous worldview. Conversion in this community is now higher, and when anybody of the Kalasha

community converts to a major religion, he or she leaves the language and culture along with their faith.

As is the case with many such communities, the affluent educated families of Northern Pakistan sometimes prefer to speak Urdu with their families or friends, and feel pride in doing so. Influence of dominant languages has increased in these communities at the cost of indigenous languages.

**The younger generations no longer understand the words of the languages their fathers or forefathers. Their indigenous languages are gradually becoming laden with words from other dominant languages such as *Urdu, Pashto* and *English*. Their culture and languages are also threatened by the popular *Urdu* dominated media - both electronic and print.**

Similarly, the global revival in religious fundamentalism and the resultant fanaticism, especially in the form of a politically-charged puritanical version of Islam, has badly affected the indigenous culture of indigenous communities. They cannot observe their folk traditions in music or rituals. Of course, these new phenomena have affected the larger society as well, but the indigenous communities cannot survive the onslaught being smaller in number, weak both politically and economically, lacking media representation and historically brutalised by similar forces.

### *Living in Hard Terrains*

All of these communities live in the mountains. Many of them living in Northern Pakistan share the same history, ancestry and culture, but cannot relate to each other being scattered and locked in hard valleys in the mountains of the Hindu Kush, Karakoram, Himalaya and Pamir ranges. This has cut them off since centuries. The *Shina* or the *Khowar* communities of Gilgit and Chitral do not know their sister communities in Swat or Dir. Even many in the Khowar community, where it is dominant, feel shy about being identified with the Kalasha, Gawar, Palula or Dameli communities living in Chitral.

## Efforts for Revitalising Endangered Languages

The aforementioned cultural, political, linguistic and ecological milieu adds to *'language and cultural loss'* among these communities. Notwithstanding the toughest challenges, there are some good initiatives that are focused on reversing the losses by:

1. Documenting the languages and cultures in question.
2. Transmitting these languages and culture to the coming generations by incorporating them in education and literacy.
3. Trying to make these local languages recognised by the government(s) of Pakistan.

## *Role of Linguist*

Although ethnographical and anthropological work on these communities was done in the past few centuries by researchers and various officers of the British empire, systematic efforts for revival of many indigenous languages started after the '90s, especially in the beginning of the third millennium.

As mentioned earlier, sociolinguistic surveys of these languages started in the late '80s that laid the foundation of later efforts carried out privately. The linguists did research for scientific reasons; and indeed for some personal gains. The foreign linguists came to the areas with research grants from their universities, employed individuals from these communities as key informants and began to document and analyse the languages.

## *Role of Informants*

Unlike the research done since the Seventeenth Century, informants of these various linguists and researchers were individuals from the 'subject' communities. In the past, most of the research on these communities and their languages was done by colonial researchers who employed 'middlemen' from outside the communities, like the Pushtuns or Indians, who used to work for the British government.

## *Training Locals*

Foreign linguists felt the need of training local informants as they wanted their work done easily and more authentically. Hence, they started to train the locals in basic linguistics and documentation. For this purpose, they also established a resource centre. One such research centre was established in Peshawar in 2003 called the 'Frontier Language Institute (FLI).' This Institute trained a considerable number of individuals from these communities in basic linguistics and anthropology through short courses designed by renowned linguists and anthropologists. Trained people from these communities carried out work on their languages and a number of them founded organisations in order to sustain revitalisation efforts. Thus, the efforts became community-based. The strategy designed was multi-fold: research, training, advocacy and mobilisation.

**Research and training led to developing writing systems for the local languages, documenting oral literature and culture, producing reading materials; while advocacy and mobilisation led to greater support from the community as well fostering awareness at the local and national level.**

Some of the initiatives worth mentioning include:

1. **Forum for Language Initiatives (FLI):** This is a civil society organisation (CSO) established in 2003 with the aim of training people from the indigenous communities in Northern Pakistan so as to enable them for documentation and promotion of their languages. FLI has so far trained scores of language activists in more than a dozen languages in basic linguistics, orthography development, cultural research, teacher training, community mobilisation and advocacy. It is a resource centre for many language communities in the northern mountainous region of Pakistan (FLI n.d.).

2. **Idara Baraye Taleem-o-Taraqi (IBT):** This is a CSO based in Swat. Established in 2007, IBT has revitalisation, documentation and promotion of endangered languages, especially *Torwali* language, as one of its main objectives. This forum has so far published a number of books in and on the *Torwali* language. It has also been successfully implementing a mother tongue-based early childhood multilingual education initiative among the Torwali community in Upper Swat. The programme has currently four community schools with 200 students aged 4-9. IBT also works for social and cultural empowerment of all the language communities in Northern Pakistan because it aims 'to transform the most neglected sections of Pakistani society, especially the marginalised ethnic groups living in northwest Pakistan into empowered and developed communities by the active participation of people without any gender, racial and religious discrimination' (IBT 2019, p. 2).

3. **Gawri Multilingual Education Programme:** This is a community-led initiative by the Gawri Community Development Programme (GCDP). *Gawri* is a sister language of *Torwali* and is spoken in Kalam, Swat and in Upper Dir district. GCDP has to date published a number of books in and on *Gawri*. It has also been implementing a mother tongue-based early childhood multilingual education project in the area (Sagar 2018).

4. **Palula Multilingual Education Programme:** This initiative is in southern Chitral under the Palula Community Welfare Program (PCWP). The PCWP has also been running similar programmes as GCDP and IBT.

5. **Kohistani Multilingual Education Programme in Indus Kohistan**: This initiative is run by the community-based organisation 'Initiative for People in Need' (IPN n.d.).
6. **Khowar Multilingual Education Programme in Chitral:** This initiative is run by Mother-tongue Institute for Education and Research (MIER) (Alhaj 2014).

7. **Anjuman-i-Taraqi-i-Khowar:** This association for the development of *Khowar* is a literary organisation established in 1954 by *Khowar* speakers in Chitral. Since then, it has been publishing books in and about the *Khowar* language (Kamal 2018).

8. **Ayun and Valleys Development Programme** (AVDP): This organisation is run by the Kalasha youth for the revival and maintenance of their unique culture. (Farooqui 2011). This is, however, not the single organisation working for the Kalasha language and culture. There are other indigenous organisations as well such as Ishpata.

9. **Bakarwal Mobile School System:** This initiative is for the nomadic Gujars in Azad Jammu & Kashmir (Bakarwal Mobile School 2012).

10. **Hindko-based Multilingual Education Project**: This initiative is run by a community-based organisation in Abbottabad, Pakistan.

11. **Shina:** In Shina, though there is no mother tongue education programme, yet there are a number of initiatives by organisations and individuals that have been in the field working for the revitalisation of the language and its music. Among these initiatives one is Shina Language Community Programme.

12. **Wakhi:** In Pakistan, there are a number of initiatives working for the revival of the *Wakhi* language and its associated culture. A few individuals, who formerly worked with linguists, have been carrying out various activities on the language, and more importantly on its music and culture. The Bulbulik Music School established by Gulmit Educational and Social Welfare Society has been training young people in playing Pamirian instruments (Pamir Times 2017). There is a website for *Wakhi* and *Wakhi* stories, poems, essays and research (Beg n.d.). Another is the 'Initiative for Preservation of Pamirian Arts and Culture (IPPAC)'.

13. **Burushaski Research Academy and Burushaski Language Documentation Project:** The Burushaski Research Academy was founded by Allam Nasi Uddin Hunzai in the early '80s, and since then, it has been dedicated to the research and revival of the language. It has published works in and about *Burushaski* (Burushaski Research Academy n.d.). The project is an initiative led by the American linguist Ms Sadaf Munshi (Burushaski Language Documentation Project 2015). The products of the project are available online.

14. **Balti:** There are small-scale initiatives for the *Balti* language in Pakistan led by the Balti people. Considerable literature is produced in *Balti* (Baltiadab n.d.).

Not all of these languages are used in education. The ones used in education, the mother tongue-based multilingual education or MTB-MLE, are *Torwali, Gawri, Khowar, Palula, Indus Kohistani, Gojri* and to some extent the *Kalasha*; and these educational programmes are managed and run by organisations without any support from the government. In these mother tongue-based early childhood multilingual education programmes, the children start their education in their mother tongue for a year where all the subjects (Math, Social Studies, Ethics and Literacy) are taught in the respective mother tongues. Later in the second year, *Urdu*, and one semester later, *English* is introduced as subjects first orally, and then, in written form.

## Saving Endangered Languages through Information Technology

Information Technology, especially the Internet, has put endangered languages at further risk and greater challenges. Experts suggest that a key factor in any language revitalisation project is the use of the language by the younger generation. Today, the younger generation lives in a digital age which is ever changing. Given this reality, the initiatives mentioned earlier have also been trying to use the digital media to reach a larger and younger audience.

**For many, *Torwali, Kohistani, Khowar* and *Shina* keyboards have been developed for the Google Play Store so that the younger generation may use these languages on social media.**

The indigenous music of some of these languages is also thriving in digital platforms. Music of *Shina, Khowar, Torwali, Balti, Burushaski* and *Wakhi* is shared rigorously on social media, particularly via YouTube, Sound Cloud and Facebook.

For research, documentation, analysis and archiving, a number of computer-based programmes are being used by linguists and activists around the world. These programmes are also used by local linguists for their indigenous languages.

## Conclusion

Many initiatives to save, protect and promote endangered, indigenous languages in Pakistan are run by organisations dependent on foreign funding. This makes these initiatives vulnerable and there is always the danger that the work may not be sustainable over a long time. Many communities do not have community-based initiatives because the linguists who initiated research on these languages could not support the communities for a longer period. These languages are *Bateri, Dameli,*

*Gawarbati, Yidgha, Kamviri, Kativiri, Ushojo, Chilliso, Gawro, Domaki, Madakhlashti, Kalkoti, Gawro, Chilliso* and *Mankiyali*. If immediate action is not taken, these languages will be moribund in the next decade.

The Government of Pakistan must recognise these languages and set up plans for the preservation and promotion of these sources of indigenous wisdom and history. Globalisation, with all its modern technologies, is a threat to native communities, but, it can be turned into an opportunity if proper measures are undertaken for including these languages in national education and by the media.

International donors also need to focus on this shrinking cultural diversity of Pakistan. Preservation and promotion of cultural diversity is also vital for reviving tourism in the country. This rich repertoire of cultural diversity can effectively add to the creative economy of Pakistan. Holistic and integrated strategies need to be adopted for the sustainable development of these communities and their culture in Northern Pakistan.

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# EMERGING TECHNOLOGIES AND REGIONAL STABILITY

## Controlling Exports of Emerging Technologies to Reduce Proliferation and Improve Global and Regional Stability: Case of the European Union

## Emerging Technologies, Crises, and Decision-making: Impacts on South Asia's Security Calculus

Perspective Essay

# Controlling Exports of Emerging Technologies to Reduce Proliferation and Improve Global and Regional Stability: Case of the European Union

*Dr Sylvie Matelly*
Deputy Director,
IRIS - French Institute for International and Strategic Affairs,
Paris, France

**Abstract**

The fight against proliferation of emerging disruptive technologies and goods, in an interconnected world, is a major challenge for global security and stability. Export control is a key tool in meeting this challenge. Since the end of the Cold War, the modalities of this control have been revised both internationally and nationally by states exporting sensitive goods and technologies. However, it is important to consider the obstacles in such reorganisation and from this point-of-view, the European experience to establish common rules between member states in the field of export controls can be useful. This chapter identifies the vectors and risks of proliferation of emerging technologies in the context of globalisation, and discusses the importance and limitations of export controls of the current regimes. Finally, it briefly presents the European initiatives and the lessons they can offer to improve the international regime of export control.

## Introduction

The major challenges of global and regional security and stability in the fight against proliferation of disruptive technologies and goods require attention. Indeed, goods and technologies enabling the production of Weapons of Mass Destruction (WMD) can easily be acquired by states or non-state actors directly on the world market. Export control is a key tool in meeting this challenge. Since the end of the Cold War, the modalities of this control have been revised both internationally (in the framework of the Wassenaar Arrangement) and nationally by states exporting sensitive goods and technologies (Aoi 2016).

However, globalisation and its consequences - such as the multiplication of countries exporting potentially proliferating technologies or the acceleration of the cycle of innovations – make it vital to improve and strengthen these control mechanisms (Beck and Gahlaut 2003; Chapman 2013). The obstacles to such a reorganisation are important and from this point-of-view (Bergenäs 2008), the European experience to establish common rules between member states in the field of export controls can be useful.

This chapter questions the necessary reform of export control of emerging technologies in three parts. The first part identifies the vectors and risks of emerging technologies' proliferation in the context of globalisation. The second explains the importance of export controls to limit proliferation and some existing limitations of the current regimes. Finally, the third part presents European initiatives in the field of export control and the lessons they can offer to improve the international regime of export control.

## What are Weapons of Mass Destruction?

Weapons of Mass Destruction (WMD) can kill and bring significant harm to numerous humans and/or cause great damage to human-made or natural structures as well as to the biosphere. Over the years, the scope of the term has evolved with changing threats and armaments. The term was used for the first time after the bombardment of Guernica by Cosmo Gordon Lang, Archbishop of Canterbury in 1937.[1] Then, it referred to chemical explosives during World War II or nuclear attacks after the war and during the Cold War. It later came to refer to large-scale weaponry of other technologies, such as chemical, biological, radiological, or nuclear warfare.

[1] Archbishop's Appeal, *Times*, 28 November 1937.

Whatever the definition or scope, which has often been disputed, the proliferation of WMD is widely recognised as a primary security challenge of past few decades (Fuhrmann 2008).

**In this context, rapid and often disruptive technological developments are currently renewing the way in which the question of proliferation arises for at least two reasons: one endogenous and linked to the nature of these emerging technologies; the other exogenous dealing with the evolution of the world and globalisation (Wallerstein 2009).**

## Proliferation and Emerging Technologies

Today, various characteristics of emerging technologies are increasing the risks of proliferation:

**First**, the innovation cycle is becoming faster and faster. While it took more than 70 years for the phone to become a consumer item (more than 50 million users) and 15 years for the personal computer, emerging technologies may diffuse in a few months today. This situation may create an increasing gap between the cycle of emergence of new technologies, the identification of risk concerning the emerging technology, and the implementation of the necessary measures to prevent risk.

**Second**, emerging technologies are mostly dematerialised (cyber, Artificial Intelligence (AI), connected objects etc.) and if they are not, it is easy to transfer the user instructions by email. In the past, most technology transfers were physical either via the export of goods incorporating technology or before the possibility of intangible transfers by sending or exchanging paper manuals. There was, therefore, a border to cross and the possibility of a double-check, first when applying for an export authorisation (license), and secondly, when going through customs. This has become increasingly rare and the possibilities of escaping control are considerably facilitated.

**Third**, during the Cold War, most research and development (R&D) investments were made by public funds and invested in defence companies. Risky new technologies were mostly military, meaning their export was forbidden and only possible with a state agreement. The situation has radically changed and investments in new technologies and innovations are now mostly civilian and can normally and freely access the market (Rath et al. 2014). In this situation, it creates new business and spin-on (the application of civilian technologies to military equipment) opportunities for the defence industry which accelerates the emergence of smart weapons systems, and digital military platforms by data accumulation. It also leads to increasingly blurred lines between civilian and military equipment.

## Proliferation and Globalisation

The production of emerging technologies, needed for proliferation, was previously concentrated in the hands of a small group of supplier countries. With globalisation, companies have internationalised their value chain, producing and innovating in several territories (Irwin 1989). Transfer of goods, services, and technologies between countries has become easier and increasingly numerous, throughout the production process (Fiot 2014).

**Globalisation has increasingly spread the production of emerging technologies to a larger number of states and players (both public and private).**

Proliferators are able to move their WMD programmes freely in the international market, acquiring many items and technologies necessary in the process. This spread of emerging technologies raises serious security concerns: The **first** is connected to the issue of military superiority, which remains central for many states (Kroenig 2009). The current trade war between the United States (US) and China is a good example of these concerns and the main argument given by Washington to justify increasing tariffs was national security. The **second** concern is more global, directly connected to the instability and risk created by the proliferation of WMD.

**Globalization has redefined the relationship between trade and security (Bertsch et al. 1994, p.29).**

All these issues complicate the challenge of limiting proliferation and ensuring that new technologies do not threaten international and regional stability (Fitzgerald 2014). One of the main instruments to moderate this is through Export Control Regimes (Cupitt et al. 2001). Export control concerns armament or dual-use items. It is organised by nation-states in the framework of various international protocols or agreements (e.g. the Wassenaar Agreement, Zangger Committee, Australia Group, etc.) However, given emerging technologies, these need to adapt to strengthen their efficiency.

## Export Control Regimes: Interests and Limitations

Export controls are laws that regulate the export of sensitive goods, technologies, equipment, software, and services to foreign countries. They are not necessarily prohibitions, but they require government permission or license for the export or dissemination of controlled goods and technologies.

**Export control can be defined as a trade policy designed to ensure global and regional security objectives in the framework of the non-proliferation of WMD objectives (Stinnett et al. 2011).**

Two main categories of goods can be subject to export controls: armaments and dual-use goods (Davis 2002). Armaments are relatively well-identified. They include military equipment used by the army in conflicts or prevention of it. Dual-use goods remain more complicated to define and identify. They are generally commercial and defined as goods that can have both civil and military uses. Most commercial goods can be freely traded, but when they are controlled, it is to prevent possible military use or potential proliferation. It is, therefore, the final use of the good that determines its control, and most of the time, the risk of proliferation is estimated by the technology it integrates.

**The main goal of export control is to prevent the spread of dangerous materials and technologies to state and non-state enemies or actors to prevent them from acquiring WMD or military goods, which could harm global security and stability. It also helps to preserve relative economic and military power advantage in high-tech sectors.**

However, export control rules may reduce potentially lucrative international trade opportunities by increasing bureaucratic red tape to export sensitive goods and technologies, while other countries are less demanding (Borocz-Cohen 2014; Burke et al. 2009). They can deter foreign investments from coming to the country and hurt the competitiveness of domestic firms (Tushe 2011; Seyoum 2016 & 2017). They can also have diplomatic costs for states as they create distortions of competition between firms and countries, deterring the latter from applying such regulations (Richardson and Sundaram 2013; Parkhe 1992). State exporters are faced with the responsibility of balancing security objectives with the competitiveness of their national economy (Alavi and Khamichonak 2016).

**Consequently, combating proliferation through export control has many characteristics of a collective action problem. It can be politically and economically costly and provide opportunities for free-riding. Membership of the main international agreements (related to export control regimes) adequately illustrates the situation.**

Most national export control regimes are defined in the framework of international regimes and agreements such as the Wassenaar Arrangement,[2] the Australia Group,[3] the Missile Technology Control Regime (MTCR),[4] Nuclear Suppliers Group, or the Zangger Committee.[5] Out of the 193 member countries of the United Nations, only 42 countries have signed the Wassenaar Arrangement or are in the Australia Group or AG (biological and chemical weapons); 50 are in the Nuclear Suppliers Group; and barely 35 in the MTCR.

Overall, most European countries, North America and, in Asia, Japan and South Korea are parties to all of these agreements. Emerging economies are gradually adhering to these mechanisms. Among the BRICs,[6] for example, China and Brazil are not yet in Wassenaar but India became the 42nd member in December 2017. China started a dialogue with member countries of the Arrangement in 2003 and it presented its bill on the control of its exports in 2017 (Carlson and Luo 2017). The emerging Asian countries (Taiwan, Singapore, Malaysia, Indonesia, etc.), which are major exporters remain relatively absent from these arrangements at the moment. Similarly, apart from Turkey, which has signed four commitments, the *Maghreb* and Middle Eastern countries, including Israel, are absent (Table 1).

[2] The Wassenaar Arrangement has been established to contribute to regional and international security and stability by promoting transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies, thus, preventing destabilising accumulations. The aim is also to prevent the acquisition of these items by terrorists. See, <https://www.wassenaar.org/>.

[3] The AG is an informal forum of countries which, through the harmonisation of export controls, seeks to ensure that exports do not contribute to the development of chemical or biological weapons. See, <https://australiagroup.net/en/>.

[4] The MTCR is an informal and voluntary association of countries which share the goals of non-proliferation of unmanned delivery systems capable of delivering WMD, and which seek to coordinate national export licensing efforts aimed at preventing their proliferation. The MTCR was originally established in 1987 by Canada, France, Germany, Italy, Japan, the United Kingdom (UK), and the US. See, <https://mtcr.info/mtcr/>.

[5] The Zangger Committee was formed following the coming into force of the Treaty on the Non-Proliferation of Nuclear Weapons, commonly known as the Non-Proliferation Treaty (NPT), to serve as the 'faithful interpreter' of its Article III, paragraph 2, to harmonise the interpretation of nuclear export control policies for NPT Parties. See, <http://zanggercommittee.org/>.

[6] Brazil, Russia, India, China, and South Africa.

**Table 1: Stakeholders in Multilateral Export Control Regimes, March 2020**

| Countries | Zangger Committee | Nuclear Suppliers Group | Australia Group | MTCR | Wassenaar Arrange-ment |
|---|---|---|---|---|---|
| European Union (EU) countries: Germany, Austria, Belgium, Denmark, Spain, Finland, France, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, and Sweden | Yes | Yes | Yes | Yes | Yes |
| Other Europe: Norway, UK, Switzerland, and Ukraine | | Yes | Yes | Yes | Yes |
| North America: USA and Canada | | Yes | Yes | Yes | Yes |
| Argentina, Australia, South Korea (SK), Japan, and New Zealand | Yes | Yes (except SK) | Yes | Yes | Yes |
| South Africa | Yes | Yes | | Yes | Yes |
| Bulgaria | | Yes | | Yes | Yes |
| Croatia | | Yes | Yes | | Yes |
| Romania | | Yes | Yes | | Yes |
| Russia | Yes | Yes | | Yes | Yes |
| Slovakia | | Yes | Yes | | Yes |
| Czech Republic | | Yes | Yes | | Yes |
| Turkey | Yes | Yes | Yes | Yes | |
| Estonia | | Yes | Yes | | Yes |
| Lithuania | | Yes | Yes | | Yes |
| Latvia | | Yes | Yes | | Yes |
| Malta | | Yes | Yes | | Yes |
| Slovenia | | Yes | Yes | | Yes |
| Brazil | | Yes | | Yes | |
| China | Yes | Yes | | | |
| Cyprus | | Yes | Yes | | |
| Iceland | | Yes | Yes | Yes | |
| Belarus | Yes | Yes | | | |
| Kazakhstan | Yes | Yes | | | |
| India | | | Yes | Yes | Yes |
| Mexico | | Yes | | | Yes |
| Serbia | | Yes | | | |
| **Number of Countries** | **39** | **48** | **43** | **35** | **42** |

*Source:* Author's compilation.[7]

[7] Zangger Committee n.d., 'Members', <http://zanggercommittee.org/members.html>; Nuclear Suppliers Group n.d., 'Participants', <https://www.nuclearsuppliersgroup.org/fr/a-propos-du-nsg/participants>; Australia Group 2018, 'Press Release: India Joins the Australia Group', 19 January, <https://australiagroup.net/en/india_statement.html>; Missile Technology Control Regime n.d., 'MTCR Partners', <https://mtcr.info/partners/?lang=fr>; Wassenaar Arrangement n.d. 'About Us', <https://www.wassenaar.org/fr/about-us/>.

**The lack of participation from major supplier states is limiting the effort to reduce proliferation, improve security and stability and avoid distortions of competition.**

Current export control regimes are also facing other problems such as an inadequate level of information sharing within countries and regimes; or difficulties in national implementation since applying export control rules needs human and financial resources along with specific technical know-how not only to identify the technologies that pose a threat today, but also to anticipate technological innovations that might be militarily relevant tomorrow (Early 2009; Jaffer 2002). In this regard, the EU cooperation initiatives to harmonise export control rules within European countries may prove useful to promote and improve the effectiveness of export controls at a global level.

## The EU Experience in Export Control: A Unique Case of International Collaboration

Within the EU, control of exports of both military equipment and dual-use goods and technologies has been the subject of a concerted approach since the 1990s between member states supported by EU institutions. The challenge of this approach is threefold:

1. Support countries which, having not exported arms or dual-use items in the past, have not set up control systems and help them to do so.
2. Harmonise practices between EU member countries to limit distortions of competition.
3. Support businesses in the EU single market by reducing the cost of export control, while ensuring transparency and predictability of rules, while at the same time, a level of security as high as possible.

The approach appears all the more daring since it presupposes a high degree of trust between countries which in the past have often been opposed or waged war. It was initiated in the 1990s following the establishment of the European single market in 1992 and a framework of multiplication of trade in a global context (Haellmigk 2019).

**The European model has been envisioned as a way to manage the paradox between the will of EU member states to facilitate trade; and at the same time, to better manage them. It has enabled the implementation of various instruments that have evolved over time.**

Today, cooperation in this area revolves around three initiatives:

The **EU Dual-Use Regulation 428/2009** of 5 May 2009[8] set up a community regime for the control of exports, transfer, brokering, and transit of dual-use items and the national military list of the EU member states. This regulation has become the main legal basis for controls on dual-use goods in Europe and the legislation is directly applicable in all EU countries.

The **EU Code of Conduct on Arms Exports**[9] adopted by member states in 1998. In 2008, the Code of Conduct became a Common Position (2008/944/CFSP). This instrument seeks to create 'high common standards' for all EU members to use when making arms export decisions and to increase transparency among member states on arms exports. It defines eight criteria that may lead states to make their export decision.[10] To increase transparency, EU members report to each other when they deny a license; and if another state wants to grant a license for an 'essentially identical transaction', it must first consult the state that has made the initial denial.

The **Directive on Intra-Community Transfers of Defence-related Products (ICT Directive 2009/43/EC)**[11] aims at eliminating barriers in the internal market and encouraging competitiveness of the EU's defence industry. It came into force in June 2012.

In this framework, transfers between companies remain relatively fluid within the single market since they are free from control (dual-use) or subject to ex-post control (military equipment). Companies benefit from transparency and the exchange of information between states because they provide them with certain predictability of future decisions regardless of the state to which the license will be applied. Finally, these initiatives limit the risk of distortions of competition between companies from different countries, while supporting the integration of value chains in Europe.

8 See for details, Eur-LEX n.d. (a).

9 See, Official Journal of the European Union 2009.

10 The eight criteria of the EU Common position are: 1. Respect for the international obligations and commitments of EU member states. 2. Respect for human rights in the recipient country. 3. Internal situation in the recipient country. 4. Preservation of regional peace, security and stability. 5. National security of the EU member states. 6. Behaviour of the buyer country towards the international community. 7. Existence of a risk that the military technology or equipment will be diverted within the buyer country or re-exported under undesirable conditions. 8. Compatibility of the exports with the technical and economic capacity of the recipient country.

11 See for details, Eur-LEX n.d. (b).

## Conclusion

Lessons from the EU initiatives, to improve international export control, include looking at the methodology adopted under various initiatives and the will of member states to cooperate to ensure confidence between them.

**Greater participation of countries in international export regimes is clearly essential to improve export control all over the world and limit proliferation.**

In the same time, mechanisms to strengthen information sharing, including licence approvals or refusals have to be systematic and well-structured. International organisations may also create international teams to help and assist countries in building and managing their export control regulations. Developing new technologies and tools that make it easier to track movements of sensitive items or creating a dispute resolution mechanism can help as well.

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Policy Paper

# Emerging Technologies, Crises, and Decision-Making: Impacts on South Asia's Security Calculus

*Usama Nizamani*
Junior Consultant,
Islamabad Policy Research Institute,
Islamabad, Pakistan

**Abstract**

The crisis between Pakistan and India in 2019 witnessed the application of airpower by both countries in pursuit of political objectives. The crisis rewrote strategic history as one nuclear weapon country (India) attacked the mainland territory of another nuclear weapon country (Pakistan). This chapter analyses the dramatic shift on part of India to compromise mutual nuclear deterrence to engage in limited kinetic action against Pakistan, which led to a tit-for-tat reaction.

The emergence of disruptive military technologies has the potential of reinforcing radical approaches in decision-making that may compromise nuclear deterrence thresholds. India's airstrike over Balakot appears to be motivated by such rationale and the retaliation by Pakistan also reflected reinforcement of a similar pattern.

This study cautions that 'technology-driven tactical initiative seeking', in conjunction with psychological factors such as over-confidence, over-dominating personality and confirmation bias, may contribute to possible crisis escalation between India and Pakistan. It prescribes three policy recommendations to mitigate such an escalation: ensuring accountability of strategic decision-making bodies; scaling up the role of multilateral forums in crisis management; and diplomatic engagement.

## Introduction

The influx and exponential mushrooming of emerging technologies have opened up new possibilities. From promises of economic turnaround to threats to national security of governments, private corporations, civil society and individuals. The emergence of technologies such as Artificial Intelligence (AI), Hypersonic Weapons, Directed Energy Weapons (DEWs), High Powered Lasers (HPLs), offensive cyber capabilities, space-based dual-use military assets, and 5G spectrum can all have critical consequences due to their military applications by great and emerging powers.

**What remains least studied is the manner in which the interplay of emerging technologies will affect the evolution of inter-state crises and decision-making in leadership. This becomes particularly crucial and complex if evolution of crises is evaluated through regional dynamics e.g. considering India-Pakistan interstate relations.**

Changing regional dynamics and interstate relations will affect application of emerging technologies for strategic purposes. Consequently, crises are likely to aggravate considering the possibility of relative material power of states vis-à-vis each other or in academic terms, the *security dilemma*. Most importantly, emergence of new technologies may break traditional controls on command, control and communication (C3) and require more swift decision-making. This means teams will need to be converted into synergised, seamless and efficacious war-fighting units.

**Efficiency in decision-making courtesy of emerging technologies, conversely, holds the possibility of enabling leadership to err, and perhaps be imprudent, while deliberating alternatives. Consequently, this is likely to cause accidental conflict, war, misadventure or miscalculations.**

As technologies evolve at a faster pace, their testing in controlled environments or in computer simulations alone inspire little confidence regarding their real world application. This gap will require space for adaptation on part of the military and political leadership. Given this backdrop, the need to draw inferences in terms of a political and military leadership's ability to interact and apply such technologies remains unchartered territory, at least in South Asia.

To appreciate the role and interaction of different psychological factors with strategic and military technologies in decision-making requires further deliberation. Decision-making does not occur in isolation, rather evolves in a larger context. Therefore, examination of regional dynamics in South Asia, involving India and Pakistan and possible interaction of their leadership with emerging technologies in interstate military crisis, is greatly needed.

Emerging military technologies hold the potential of changing the landscape of warfare. As military technologies offer options to leaders for precise, lethal, and effective targeting options they can also affect decision-making ability and processes.

**New technologies provide options to political and military leadership for compellence or deterrence; and may offer a sense of enhanced confidence to carry out offensive action against an adversary. This enhanced confidence may lead to the pursuit of technological-tactical superiority in nuclear-armed adversaries such as India and Pakistan.**

Since the Cold War, conventional wisdom dictates that nuclear deterrence prevents direct military engagement given threat of retaliation and mutual deterrence between nuclear-armed states. Confirmation bias in leadership can close the window of weighing alternative actions.[1]

Based on secondary sources, this study hypothesises that emerging technologies in regions such as South Asia, can compound the ability of leadership to make prudent strategic decisions, given the pressure of narrow time-windows, geographical proximity (Khan 2003), disinformation or lack of information and the consequent tendency to act it, and the role of confirmation bias in decision-making processes. Using a new model (Figure 2), it looks at the role of emerging technologies and how these may impact decision-making of leadership during a crisis situation. To this end, the model studies the tendency to exploit relative technical-tactical superiority and desire for 'initiative-seeking offensive action' in a future crisis involving India and Pakistan. This kind of 'initiative-seeking' when nuclear-armed states directly engage each other, through use of limited military force, is new, as in the 2019 crisis. It also discusses the impact of aforementioned on escalation of possible future crises in South Asia.

## Emerging Technologies in the Military Domain

There are a range of emerging technologies which will redefine the conduct of warfare and military operations. Some of these technologies will not only exert pressure on the existing regional and strategic stability architecture, but will also have the potential of aggravating crises and exercising strain on decision-making. These technologies include development and operational application of Hypersonic Weapons, Artificial Intelligence-driven platforms such as Autonomous Unmanned (land, aerial,

[1] It may be argued that to evaluate presence of confirmation bias on a case-to-case basis warrants scrutiny of primary data. As a valid argument, this cannot be discounted. However, evaluation of documented information from primary actors can be analysed to identify presence of confirmation bias. Furthermore, being an extensively studied phenomenon, confirmation bias has been found to affect decisions regarding public policy, political choices, faith, cultures, lifestyle and strategy on a range of individual and group choices (Haidt 2011).

underwater and drone ships) Vehicles, cyber capabilities, Directed Energy Weapons (DEWs), High Powered Laser (HPL) weapons, Remote Sensing Satellites (RSS), Navigation and Communication Satellites and 5G spectrum technology.

## *Hypersonic Weapons*

Hypersonic weapons due to their sheer velocity, manoeuvrability and impact are an upcoming disruptive military technology. They can travel up to the speed of Mach 5[2]+ and are endo-atmospheric weapons, thereby, reducing the possibility of detection by radars. Due to their speed, these weapons can reach and hit their target within an hour anywhere on earth. The United States (US), Russia, China, France and India are working on different types of hypersonic weapons.

**China** is developing and testing a variety of hypersonic missiles. In September 2018, Beijing is reported to have tested three different types of hypersonic cruise missiles i.e., D-181S, D-182S, and D-183S (Saxena 2019). The same year in May, China tested a DF-17 ballistic missile fitted with a Hypersonic Glide Vehicle (HGV). After covering a distance of 1400 km, it landed within meters of its designated targeted in Xinjiang Province (Ibid.). HGVs can be mounted on Inter-Continental Ballistic Missiles (ICBMs) such as DF-41. Similarly, China also tested XingKong-2 or Starry Sky-2 hypersonic aircraft in August 2018 (capable of being launched from a missile) after which it flew at a speed of 5.5 to 6 Mach at an altitude of 30 km (Zhen 2018).

On 26 December 2018, **Russia** also tested different types of hypersonic weapons, including the Avangard HGV payload, which was mounted on ICBM Sarmat, RS-28. The Avangard HGV reached a speed of Mach 20 and carried out extremely evasive manoeuvres (Ruptly 2018). Russia Today (2018) reported that Moscow also tested an aircraft launched Hypersonic Cruise Missile KH-47M2 Kinzal capable of flying at the speed of Mach 10 to a range of up to 2,000 km.

On 19 March 2020, the **US** Army and Navy jointly tested a Common-Hypersonic Glide Body (C-HGB). The Trump administration requested USD 3.2 billion (FY 2021) for developing the hypersonic programme in order to attain and maintain the lead in this area (The Express Tribune 2020).

**India** has the BrahMos supersonic cruise missile which can fly at a speed of Mach 2.8. BrahMos Aerospace has plans to upscale the speed to Mach 5 and Mach 7 in three years and perhaps in a decade, respectively (Noronha 2019, p.107). India's Defence, Research and Development Organisation (DRDO) is also seeking to develop a Hypersonic Technology Demonstrator Vehicle (HSDTV) which can reach Mach 6.5 at an altitude

[2] 1 Mach is equal to 1234.8 km per hour.

of 32 km after attaining autonomous scramjet flight for up to 20 seconds by utilising a solid rocket launched booster (Ibid.). The Indian Army's 'Land Warfare Doctrine-2018' stresses building and augmenting hypersonic missiles as part of its larger objective of maintaining Full-Spectrum Dominance (FSD) in a conflict (Indian Army 2018).

## *Directed Energy Weapons (DEWs) and High Powered Laser (HPL) Weapons*

DEWs offer different means of engagement to conflicting parties in the overall conflict spectrum. They comprise of non-explosive systems which emit highly focused laser, radio waves, electromagnetic radiation and microwaves with the ability to inflict damage, and in some instances avoid collateral damage, which may render it as a weapon of choice (Noronha 2019, p.106). At present, these include High-Powered Microwaves (HPMs) and high-powered laser weapons.

HPMs often use microwave energy to disrupt electronic and communication systems. The US Air Force Research Laboratory and Boeing, through successful demonstration of Counter-electronics High Power Microwave Advanced Missile Project (CHAMP), have shown that these are capable of knocking out electronic and communication system without physically damaging the infrastructure. The CHAMP may be fixed on an AGM-86C cruise missile launched from an aircraft (CNN 2015). After being launched, it is capable of directing microwave energy on a building, grid or small area. The beaming can result in generating a strong surge of power in electronic appliances, including tanks and vehicles of the adversary rendering its electronic hardware dysfunctional. The damage can be swift and may even be permanent (Ibid.).

Another emerging disruptive military technology is the High-Powered Laser (HPL) weapon capable of creating different effects and impact. These weapons due to their stealthy lethality can deliver precise and targeted results. HPLs, in their testing phase, are being mounted on land, air and sea-based platforms. The intensity of the laser beam can be adjusted for either damaging, destroying or disabling the target. The HPL can also be aimed to degrade electronics, electro-optical sensors or infrared systems (Noronha 2019, p.106). Their use has been demonstrated as an air-defence weapon to damage and destroy Unmanned Aerial Vehicles (UAVs).

## *Artificial Intelligence (AI)*

One of the hallmarks of the Fourth Industrial Revolution (4IR) is introduction of AI in research, development and innovation. Different types of AI such as Machine Learning, Deep Learning, Reinforcement Learning, Natural Language Processing, and Generative Adversarial Networks are allowing researchers to toy with new revolutionary innovations and ability to build up on previous algorithm models. Semi-

autonomous and fully autonomous systems, in combination with different types of AI, are enabling introduction of different software and hardware to meet the needs of civil and military clients, both in the public and private domain.

Many countries have been gearing up to direct their resources towards AI-driven research and development:

In February 2020, the **US** proposed upscaling its overall non-defence related AI spending from USD 937 million to USD 2 billion by 2022. Defence-related spending on AI by the Department of Defense (DoD) will also be scaled up from USD 780 million to USD 841 million in 2021 (Coldewey 2020).

It estimated that **China** so far is leading with overall spending on AI. However, some of these estimates are not static and vary between upper and lower limits. In non-defence AI R&D spending, it is estimated that China could be spending between USD 1.7-5.7 billion, whereas in defence-related AI R&D, China is investing between USD 0.3-2.7 million, whereas US is spending about USD 4.9 billion (Hao 2019).

**Apparently, while the US is outspending China in military-related AI R&D spending (Hao 2019), China appears to be outspending the US in overall AI-related expenditure, where it estimated that it may be spending about USD 8.4 billion in the upper bracket (Figure 1).**

China's spending also appears to be reflected in its estimation of AI as a core industry which is likely to 'exceed 150 billion, RMB (~US$ 21.7 billion)' and 'scale of related industries move to 1 trillion RMB (~US$ 150 billion)' in 2020. These figures are estimated to follow an upward trajectory by '~ US$ 150 billion and US$ 1.5 trillion by 2035, in estimation of AI's core industry and scale of related industries', respectively (Graham et al. cited in Kulshrestha 2019, p.121).

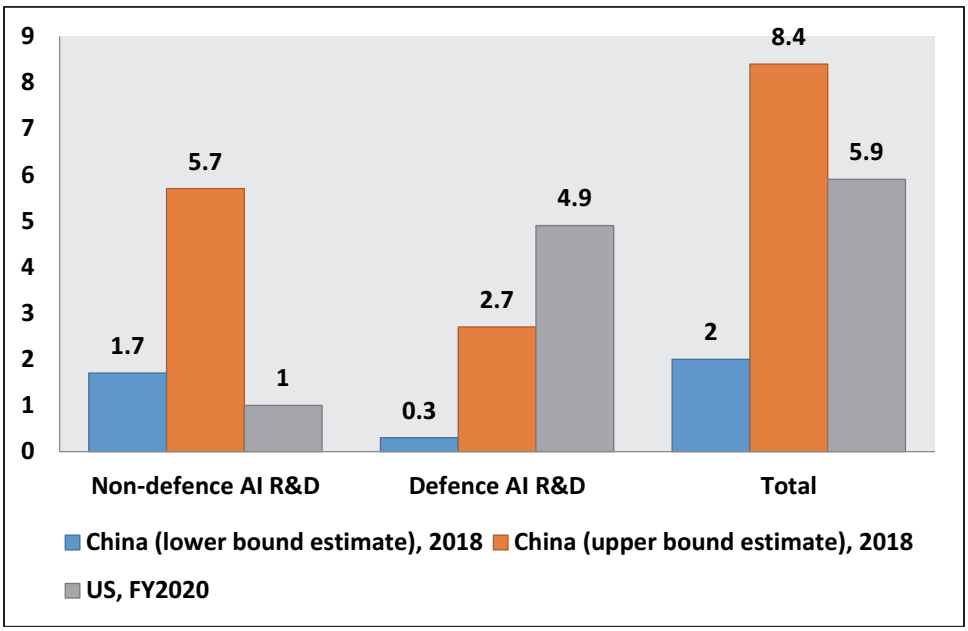
**India** also appears to be following suit in South Asia. In its bid to promote AI, machine learning, 3D printing and other emerging technologies, the country devoted USD 477 million in 2018 under its Digital India Programme (Kulshrestha 2019, p.123).

A multi-stakeholder task force in India has proposed a roadmap for AI in national security. The plan stresses taking stock of the ongoing developments in defence sector across the world and to capitalise in developing fully and semi-autonomous weapon systems for aviation, land, naval systems comprising human-in-the-loop and human-on-the-loop by collaborating with start-ups and commercial industry in order to strengthen the R&D base in India.

The DRDO also houses a dedicated Centre for Artificial Intelligence and Robotics (CAIR), which focuses on four general thematic areas, including Communication and

Networking, AI, Robotics, and Control Systems and Command, Control, Communication and Intelligence Systems and Networking and Communication Secrecy (Kulshrestha 2019, p.123). Kulshrestha (2019) argues that India also sees growing relevance of AI applications in naval operations and warfare, such as development and deployment of multi-domain naval swarm drones and countering solutions driven by AI, including AI-based scheduling and decision support in Electro Magnetic Operations and using AI as a Landing Signal Officer on aircraft carriers for assisting aircraft landing (AI task force hands over final report to RM, cited in Kulshrestha 2019, p. 123).

**Figure 1: US & China's AI Research and Development (R&D) Spending (in USD)**




*Source:* China data from Center for Security and Emerging Technology; US data from US government and Bloomberg cited in Hao 2019.

## *Remote Sensing and Communication Satellites, Cyber and 5G Spectrum*

The space domain remains central in achieving a force-multiplying effect as it offers different actors the opportunity to place diverse satellites, space-based sensors, kinetic platforms that can help achieve various strategic goals and operational objectives. The US remains a leader in this area with about 166 military satellites in orbit, followed by Russia and China which have 89 and 84 military satellites, respectively (Pant 2019).

The USAF operates a constellation of 77 satellites, enabling it to detect missile launches and nuclear detonations. President Trump decided to raise a standalone Space Force costing USD 13 billion in its first five years (Reuters 2018).

At the regional level in South Asia, India has significantly built up a strategic reserve of its navigation, communication, intelligence, surveillance, and reconnaissance satellites. It has achieved independent navigation capability, which is being harnessed for civil, commercial and military applications. To this end, India has deployed a constellation of seven navigation satellites. It has over 295 satellites in the space which include civil, commercial and military satellites (Pant 2019).

**New Delhi also seeks to deploy a network of space-based interceptors in order to operationalise its Ballistic Missile Defence (BMD) system against Pakistan. It has effectively placed a constellation of 13 remote-sensing, navigation, and communication satellites in the Lower Earth Orbit.**

India also has dedicated communication satellites for each of its Armed Forces. The Rukmini communication satellite provides communication services to the Indian Navy (Pant 2019). Similarly, the communication satellites GSAT 6 and 7 provide communication services to the Indian Army, while GSAT-7A and 7-C provide communication services to the Indian Air Force (Ibid.). It also has Radar Imaging Satellites RISAT-2, RISAT-2B, and RISAT-2BRI and it has demonstrated its anti-satellite capability and destroyed satellites in lower Earth orbit (Jalil 2020). In the future, incorporation of autonomous technologies under AI such as Deep Learning will help improve BMD platforms in tracking the trajectory and intercepting traditional ballistic missile warheads.

Fifth Generation (5G) technologies can provide breakthrough in enabling upcoming platforms that will rely on AI-driven technologies and network-centric operations. 5G spectrum allows technologies to be set up at 'electromagnetic spectrum's different segments ('the spectrum'): sub-6, which operates below 6 GHz, and millimetre wave (MMW), which operates between 24 and 300 GHz (Gigahertz) (Congressional Research Service 2020).

5G spectrum is also anticipated to be harnessed for civilian application. Its application will unleash use of different technologies such as Internet of Things (IoT), autonomous and semi-autonomous devices, precision agriculture systems, advanced robotics machine learning, and deep learning. In terms of its military application, intelligence, surveillance, reconnaissance systems and processing will drastically transform command and control, and logistics systems, autonomous and semi-autonomous drones enabling low latency-driven efficient operability (Ibid.).

5G spectrum has also become a bone of contention. A trade war has ensued between the US and China over access of the latter's telecom giant Huawei to European, Asian and African markets, where it can become the market leader in introducing 5G mobile technologies. The US sees Huawei as a trade competitor and as a security threat, citing its potential complacency to intercept communication and share data with China's state institutions (Harrell 2019).

**The threat of cyber-attacks to civil, private and military installations looms larger as great and major powers, including smaller powers and non-state actors are exploiting their capacity in the cyber domain. Cyber-attacks on infrastructure such as nuclear installations, to electrical grids, hospitals, banks, and regulatory bodies with large data have been undertaken by state actors, and at times, by state-sponsored institutions.**

States are also gearing to have dedicated cyber commands for offensive and defensive cyber operations. At the regional level, India has set up a Cyber Command under its Integrated Defence Staff HQ, which is also in-charge of jointmanship in addition to serving as the HQ for Special Operations and Space Command.

## Analysis of Pakistan-India Crisis 2019

The security environment in South Asia has been reshaped after the 2019 crisis between India and Pakistan. The distinctive attribute of this crisis was that for the first time in strategic history, a nuclear-armed country attacked the mainland territory of another nuclear-armed country.

**Mutual deterrence, which characterised strategic restraint between India and Pakistan, at last, led to uninhibited strategic behaviour as India's decision to carry out airstrikes on Balakot illustrated the need to seek tactical-level initiative on Pakistan's mainland territory. However, the attack came with swift retaliation from Pakistan.**

This was acutely different from engagement across the Line of Control (LoC) between Indian and Pakistani troops in the form of ceasefire violations or Kargil-like crisis.

When the Indian Air Force (IAF) carried out an airstrike on the morning of 26 February 2019, it went in with the strategic calculation that this would lead to possible 'inaction' from Pakistan. This may have been the strategic calculus since such a kinetic action does not categorically fall within clearly defined parameters of aggression and since staying under operational and nuclear strategic thresholds of retaliation, Pakistan could have opted not to retaliate.

Most importantly, IAF and Indian leadership believed there was an available gap for military action against Pakistan (NDTV 2020). The IAF, however, with four mass formations attempted an approach towards Pakistan from four different locations, including Sir Creek near Karachi, Rahimyar Khan in South Punjab, Fazalika near Central Punjab and Balakot in Khyber Pakhtunkhwa across the LoC (PTV News 2020). The Pakistan Air Force's Combat Air Patrols (CAP) were able to prevent incursion from all points and all formations, barring the formation comprising of Mirage 2000 aircraft heading towards Balakot, which launched their stand-off Spice 2000 glide bombs from approximately 40 kms and violated Pakistani airspace by almost 2-3 kms. The same formation faced interception from PAF's CAP and was forced to turn back (Ibid.).

On the morning of 26 February 2019, Pakistan's government decided to retaliate against this violation of its sovereignty (France 24 2019). The PAF, the following day on 27 February 2019 comprising different formations of Mirage 5s, F-16 and JF-17 aircraft undertook retaliatory airstrike against Indian targets across the LoC. During its aerial operations, PAF engaged various military targets on ground by guiding their Beyond Visual Range (BVR) weapons away from the designated military installations for controlling escalation of the crisis (Tufail 2020).

During this aerial engagement, an approaching Su-30 of the IAF was targeted with a BVR AIM-120C AMRAAM.[3] The engagement caused disarray among the IAF airborne formations. The IAF Mirage 2000s air-bound at the time were also compelled to disengage and return, while IAF's MiG-21 Bisons on ground were scrambled. During its aerial operation, PAF was able to establish air-superiority courtesy of its airborne and ground jammers, which were able to jam the Indian air-defence and combat control towers' communication with MiG-21 Bisons (Ibid.). One of the MiG-21 Bisons, in its inability to establish communication with IAF's control tower, crossed the LoC and was engaged by F-16s AMRAAM (Ibid.).

The Electronic Counter Measures (ECM) adopted by PAF vis-à-vis IAF also demonstrated the efficacy of the foregoing measures in this aerial combat (PTV News 2020). However, following Pakistan's airstrikes, it was also reported that India had threatened to deploy its surface-to-surface missiles against Pakistan. The latter had already called a National Command Authority (NCA) moot after IAF's Balakot airstrike and threatened to retaliate disproportionately to India's missile strikes against Pakistan (Miglani and Jorgic 2019). However, following PAF airstrikes, Prime Minister Imran Khan offered to de-escalate the crisis and called on India to engage in dialogue (Al Jazeera 2019). India reciprocated by agreeing to de-escalate the crisis.

[3] Advanced Medium-Range Air-to-Air Missile.

## Role of Technology in Crises: Decision-Making and Regional Stability

**The traditional 'action-inaction paradox' never played out in accordance with the war-planning undertaken by India on paper during the foregoing crisis with Pakistan in February 2019.**

The 'action-inaction paradox' entails that a state initiating military 'action' in a nuclearised environment may undertake action with the intention of inducing 'inaction' in the adversary - a desired objective sought by India when it decided to carry out the airstrikes on Balakot. In other words, the IAF and Indian leadership was exercising 'coercion' to achieve 'deterrence' induced effect and response from Pakistan. Expecting Pakistan not to retaliate to the airstrike over Balakot, the objective by the initiating actor or state (in this case, India) was to exercise escalation control and to ensure that the adversary did *not* resort to retaliation. When this concept was applied to the India-Pakistan crisis of 2019, it appears that the retaliation that followed, demonstrated that 'inaction' was not accepted as a learned-response by Pakistan's leadership. The faulty rationale of undertaking an 'action' by one actor to instill 'inaction' in the other entails risks of eroding the delicate architecture of mutual deterrence and strategic stability in South Asia

It was the play of relative technological superiority which first gave the incentive to the IAF, and later to the PAF to carry out a retaliatory strike. However, emerging technologies in the future may consolidate such agency culminating in 'technological-tactical initiative-seeking.'

The emergence of new military technologies will determine the manner in which strategic leadership interacts, perceives and approaches use of emerging technologies in the war theatre.

Such technologies have the potential to wear off strategic restraint which has exercised agency over the respective country's leadership to not initiate action on the other state's mainland territory since overt nuclearisation in 1998 by India and Pakistan. India's stand-off weapons capability provided it relative confidence to exploit a gap under the nuclear threshold and establish a 'new normal' in interpretation of thresholds of mutual deterrence between both countries.

On 27 February 2019, Pakistan's Foreign Office (after PAF's retaliatory airstrikes) declared that it would not allow India to create a 'new normal' in South Asia by displacing the status quo nature of mutual deterrence in the region (MoFA 2019).

Actions from both sides, setting aside the selection of targets and geography, demonstrated that tactical-level initiative can be undertaken and accommodated through the application of sophisticated military technologies. In the foregoing crisis, it was airpower, electronic warfare and deployment of stand-off weapons which enabled accomplishment of such limited action.

Use of technologies such as hypersonic weapons, DEAs, laser weapons, remote sensing and communication satellites, offensive cyber capabilities, 5G, and AI in semi-autonomous and autonomous systems and platforms in backdrop of geographical proximity, shortened interval for undertaking decisions by politico-military leadership, upgrades in the velocity, accuracy, trajectory of hypersonic missile systems and use of stand-off capabilities may enable tactical level 'initiative-seeking.' However, it will compound strategic stability at the regional level, when confronted by a gradually escalating crisis.

The lack of appreciation and sense of over-confidence within such technologies can lead to serious repercussions in a crisis involving kinetic engagement. The rationale cited by India's Prime Minister Narendra Modi to have sanctioned IAF to carry out airstrikes across the LoC on Balakot by suggesting that using cloud cover will help evade Pakistan's Air-Defence Radars (News Nation 2019) only defies scientific acumen and aptitude of leadership to understand how complex military technologies can entail consequences for crisis escalation (ANI 2019). Such an example is reflective of misplaced overconfidence in capabilities to exploit relative technical-tactical driven superiority gaps. These gaps may not be absolute and may be subject to narrow windows of opportunities in the form of time, geography, and force dispersal, etc.

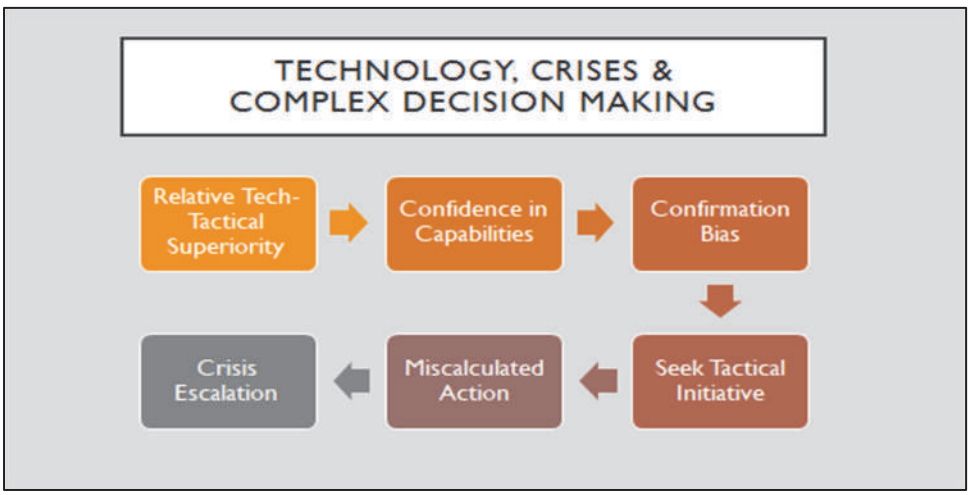
During such crisis or when politico-military leadership is contemplating application of emerging technologies, it may lead to a situation involving groupthink and confirmation bias among decision-making bodies.

In crisis situations, dissenting voices may be ignored or conveniently overlooked, thus, providing a push for undertaking tactical initiative against the adversary where needed, and in the process not taking into account, the consequences or costs it may entail from the adversary.

On top of this, a political leader's individual characteristics and hierarchy of group leadership, where a particular leader in a group is seen as an alpha male/female may exert control by being emphatic on a particular course of action favouring offensive action, irrespective of consequences (Waal 2018). These are also factors, which require further appreciation of group dynamics and behaviour under particular leadership styles and individual decision-making behaviours governing decision-making mechanisms. Interplay of such characteristics in the face of confidence inspired by the presence of disruptive military technologies holds the potential of reinforcing the

aforementioned characteristics and tendencies of both individual leaders and group behaviour. Figure 2 outlines the entailing consequences not only on how decision-making bodies may behave during an interstate military crisis, but in determining the projection of such a crisis itself, given the complexity with which a crisis develops and stakeholders respond to an evolving crisis:

**Figure 2: Emerging Military Technologies, Decision-Making Complexities and Crisis Escalation Model**




*Source:* Author's own.

Most importantly, when forces of war come into play, then Clausewitzian contradictions of *war on paper* along with *real war* and *fog of war* can spoil even the best charted out military plans and objectives. This, coupled with misinformation and disinformation to influence and distort the ability of protagonists to discern or establish veracity of claims, makes strategic calculus even more problematic and complex. The claims by India's Foreign Secretary, Vijay Keshav Gokhale, after the Balakot airstrike in a press briefing asserting that the IAF airstrikes resulted in elimination of 'a very large number of terrorists, trainers, senior commanders and group of jihadis' (MoEA GoI 2019) is something that is hard to establish in real-time. In the absence of concrete evidence, it reflected irresponsible posturing and messaging from one of the most senior ministers of India.

**During such an unfolding crisis, where facts remain undetermined, advent of emerging technologies such as Generative Adversarial Networks in the form of deepfakes or shallowfakes may force political or military leadership of any country towards further retaliatory strikes, or a political decision, which may be contrary to any government's actual position. Fact-check measures may help prevent a crisis in the long run, however, their efficacy to prevent a crisis before it goes into a tailspin is too hard to predict. Similarly, one outcome of such fake news content can lead to trust deficit between adversaries.**

Conformity-oriented assurances and confidence to execute a military plan by the top brass as conceived on paper, when political leaders as demonstrated by example of Narendra Modi reflect poor judgement and inability to execute responsible leadership, can entail serious, irrevocable consequences for regional stability.

**Similarly, inability of military leadership to highlight the risks of escalation in a nuclear environment and towing uncritical compliance towards political authority, betrays responsible soldiering.**

It also exhibits a tendency to accomplish impractical military and political objectives, and in the process, blinding one protagonist from accounting for the whole range of options with which retaliation may come and result in miscalculated action from the adversary.

If such an approach towards kinetic operations becomes a norm, then introduction of emerging technologies discussed earlier may provide stand-off capabilities to engage adversaries without crossing any international borders. It needs to be pointed out that when such systems and platforms cross international borders, it constitutes violation of sovereignty. Hence, their use for conventional action at the tactical or sub-tactical level may compel the other side to retaliate. However, what remains hard to rule out is adoption of 'hair-trigger-alert options' when emerging technologies are augmented in military operations.

The operationalisation of doctrines such as 'India's Joint Doctrine of Indian Armed Forces 2017', and 'Land Warfare Doctrine-2018', which stress use of 'surgical strikes' and incorporation of different emerging technologies, may provide Indian leadership the ability to develop and incorporate a range of disruptive technologies. Initiation of limited military action, similar to the Balakot airstrike may lead Pakistan to develop similar counter-measures or at least come up with proportionate retaliation measures.

This cyclic retaliation may lead to crisis-escalation, particularly, if one country desires exercising escalation dominance or perceives that the conflict needs to be escalated to degrade the adversary's capability. Attempts of escalation-dominance in a local tactical theatre, also holds the potential of escalating a conflict.

## Crisis Management and Role of External Actors

The India-Pakistan 2019 crisis also demonstrated that multiple major powers and regional countries attempted to prevent both states from escalating the crisis. The US, China, Russia, Saudi Arabia, the UK, the United Arab Emirates, France and others took on the role of crisis managers. Crisis management in the event of military operations that lack a seamless definition of political objectives and military objectives, rests on imprudent use of violent coercion, compellence and misplaced deterrence.

**Use of disruptive emerging technologies in future crisis will place diplomats and other countries under pressure to restore strategic stability.**

Use of new military technologies, in combination with protracted cycles of retaliation, may result in intermittent escalation resulting in difficulties for crisis managers to get actors to exercise restraint. This complexity for crisis managers can become compounded with each act of retaliation resulting in aggravation of trust deficit between primary protagonists. This is likely to play an important role in how protagonists perceive each other's intentions during a crisis; and any grounds of imminent threat for pre-emptive attacks may also challenge decision-makers to exercise restraint; and as a consequence, render the delicate job of crisis management with added complications.

## Policy Recommendations

Given the manifestation of new strategic behaviours in post-India-Pakistan 2019 crisis, some measures are proposed to reduce recurring agency over 'tactical-technical initiative-seeking'. These measures are aimed at mitigating miscalculated decision-making at three levels. **First**, it prescribes incorporation of accountability of individual group members to improve quality of decision-making by strategic leadership. **Second**, it proposes incorporation of crisis management mechanisms at multilateral forums. **Third**, it stresses need for specific bilateral Confidence Building Measures (CBMs) and resumption of efforts to resolve bilateral disputes that may become sources of instability.

## *Accountability & Strong Personalities: Anti-thesis to Groupthink*

Research from Psychology helps one understand the implications of groupthink on decision-making and its outcomes, particularly in public and security policies. Factors such as overconfidence are attributed to failure of the Bay of Pigs operations (Schlesinger 1965). Whereas, in post-Vietnam US military missions, including raids on Son Tay prison to free American Prisoners of War; the Iran rescue mission of 1980; and the invasion of Granada failure are attributed to lack of reality testing, ad-hoc planning and lack of coordination in military operations' decision-making (Gabriel, cited in Kroon, Hart and van Kreveld 1991). Studies have demonstrated that incorporating individual accountability of group members increases the quality of decisions and prevents risk-taking in decision-making (Ibid.). Individual accountability also prevents the tendency to hide in the group by exercising dispersal or diffusion of responsibility. Similarly, inclusion of experts and giving weightage to their advice can also prevent recourse to risky decision-making (Ibid.).

Research has also shown that the possibility of success as an outcome of group endeavour can lead to groupthink and risk taking in group decision-making. Packer (2009) highlighted that strongly identified members in a group are likely to dissent during group activity, unlike the weak identified members that prefer silence over dissent. This consequently keeps in check groupthink from determining the course of the decision-making exercise.

A cursory overview of these empirical studies suggests that replicating similar lessons at an institutional level in strategic decision-making bodies can prevent groupthink and prevent strong leaders from exercising monopoly on decision-making (Kroon, Hart and van Kreveld 1991). At the very outset of convening strategic decision-making bodies, sensitising participants to present divergent opinions may also prevent groupthink.

**Incorporation of these values and environment conducive to dissent in strategic decision-making bodies of India and Pakistan can allow checks and balances, and offer contemplation of alternative actions.**

Most notably, recourse to kinetic action as an offensive initiative by any side, needs to be contemplated in view of its consequences. Retaliation as consequence will be a natural response given the complex security environment, history of conflict, emotions, etc., prevailing between India and Pakistan. The accentuation of retaliation and jostling for escalation dominance can result in worsening the crisis.

## *Crisis Management at Multilateral Forums: Role of the United Nations (UN) and Shanghai Cooperation Organisation (SCO)*

At the international level, the UN has a critical role to play in international politics. Volatility of the South Asian region, particularly the adverse relationship between India and Pakistan merit UN actions to devise a conflict and crisis management mechanism between these two nuclear-armed countries in particular.

Similarly, multilateral bodies of which both Pakistan and India are a part, particularly the SCO also need to mobilise and set up a crisis management mechanism. The mechanism should include other member states like China and Russia, in addition to Pakistan and India. The crisis management body should be formal, consistent and a recurring part of the proceedings of the Foreign Ministers moot at the SCO. The mechanism must also attempt to mediate and facilitate conflict and dispute resolution mechanisms so that military and belligerent initiative-seeking is not resorted to. Furthermore, the body must also censure and propose punitive action against a state exercising agency on such initiative-seeking to erode the delicate balance of strategic stability.

India has set a new precedent in the region and it would be unwise to predict that it may not repeat this pattern again. Therefore, to discourage against such recurrence, crisis management may need to be initiated at the earliest by the UN and SCO.

## *Bilateral Confidence Building Measures (CBMs)*

The missing component at the heart of preventing 'technological-tactical initiative-seeking' is diplomacy. Bilateral diplomatic engagement between India and Pakistan remains scuttled at present. After the 2018 elections, Prime Minister Imran Khan made several attempts to reach out to his counterpart Prime Minister Narendra Modi. However, India's insistence on termination of so-called 'cross-border terrorism' has disabled all efforts towards engagement. The entire momentum of diplomacy was brought to a complete halt after India revoked Article 35-A and 370 in Indian Occupied Jammu and Kashmir. However, the two sides need to initiate and resume diplomatic communication channels. This could start by both sides exchanging detailed studies of their respective concerns on security. These appraisals could help keep in check miscalculated kinetic actions.

During the 2019 crisis, India's actions were inconsistent with the conduct of a nuclear-armed country towards another nuclear-armed country. The critical factor of such a CBM hinges on the pragmatic reconciliation that kinetic action such as the one witnessed during 2019 will only invite escalation.

**The nature of any future conflict between Pakistan and India is likely to be triggered by developments in the disputed territory of Jammu and Kashmir. Its resolution requires diplomatic artifice rather than foolhardy military action-seeking.**

## Conclusion

Introduction of disruptive emerging technologies has the potential of creating complexities for political and military decision-makers during an interstate crisis given issues like geographical proximity, narrow time interval for decision-making, and possible 'fog of war'. Having a diverse array of disruptive technologies such as hypersonic missiles, offensive cyber capabilities, AI-based platforms and applications, DEWs and HPL at one's disposal may also serve as attractive options for undertaking pre-emptive or tactical level military action. A model was proposed in this study to highlight the risks involved in exploiting tactical gaps enabled by emerging military technologies. The model also factored in the sense of 'overconfidence' inspired by such an approach compounded by confirmation bias and groupthink of strategic leadership. The latter may lead to miscalculated action. Such technological-driven tactical action-seeking in South Asia's nuclearised environment holds the risk of escalating a future crisis and compromising strategic stability between India and Pakistan. The study also proposed three policy measures to prevent such an escalation between these two countries. These include incorporating individual accountability of decision-making bodies; constitution of crisis management mechanisms at multilateral forums such as the UN and SCO; and resumption of bilateral diplomatic engagement between India and Pakistan with a special focus on resolution of the Jammu and Kashmir dispute.

Notably, there is also a need to further analyse the psychological factors that will be influenced by the interaction and application of emerging military technologies in the context of South Asia given its history of conflict. Understanding the nexus between strategic leadership in crisis and disruptive technologies may enable protagonists, crisis managers, academics and policymakers to understand the trajectory and possible eventualities of a future crisis.

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# ANNEXURE

## SDC 2019: Panels at a Glance

| 2 December 2019<br>Opening Plenary at Aiwan-e-Sadr, Islamabad, Pakistan | |
|---|---|
| **Time** | **Aiwan-e-Sadr** |
| 2 December 2019<br>2:15pm – 4:00pm | 2:30pm: Guests to be seated.<br>Master of the Ceremony: Dr Vaqar Ahmed, Joint Executive Director, SDPI, Islamabad, Pakistan<br>**Programme:**<br>3:00pm: National Anthem<br>3:02pm: Recitation from the Holy Quran<br>3:05pm: Welcome Address - Ambassador Shafqat Kakakhel, Chairperson BoG, SDPI, Islamabad, Pakistan<br>3:10pm: Introduction to the 22nd SDC - Dr Abid Q Suleri, Executive Director, SDPI, Islamabad, Pakistan<br>3:20pm: Special Remarks - Mr Haroon Sharif, Former Chairperson, BoI, GoP<br>3:27pm: Keynote Speech - Dr Sania Nishtar, Federal Minister & Chairperson, BISP & Special Assistant to PM on Poverty Alleviation and Social Protection, GoP<br>3:37pm: Presentation of SDC-SAES Anthology to the Chief Guest, H.E. Dr Arif Alvi, President of Pakistan<br>Address by the Chief Guest H.E. Dr Arif Alvi, President of Pakistan<br>Group Photograph with SDPI Staff |
| 4:00pm | Hi-Tea |

2 December 2019

World Bank Dinner Plenary: Better Business Regulatory Environment: Way Forward for Pakistan

| Time | Sheesh Mehal, Serena Hotel |
|---|---|
| 2 December 2019<br>7:00pm – 9:00pm | **Chair**: Dr Ishrat Hussain, Advisor to the PM for Institutional Reforms and Austerity, GoP<br>**Moderator**: Ms Mahnoor Arshad, SDPI, Islamabad, Pakistan<br>**Guest of Honour:** Mr Zubair Gillani, Chairman, BoI, GoP<br>**Special Remarks:** Mr Patchamuthu Illangovan, Country Director, World Bank, Pakistan Office<br>**Presentation**: Mr Shabih Ali Mohib, Program Leader, Equitable Growth, Finance and Institutions, World Bank Group<br>**Distinguished Panellists**:<br>1. Ms Huma Fakhir, CEO, MAP Services Group<br>2. Mr Ahsan Zafar Syed, CEO, Engro Energy Limited, Karachi, Pakistan<br><br>**Plenary Organisers:** Mr Shahbaz Tufail &<br>Ms Mahnoor Arshad, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Mr Taimur Hassan<br>Policy R & LR: Mr Mujeeb Ur Rehman |
| 9:00pm | Dinner |

Day 2
3 December 2019
Introductory Plenary
Sustainable Development in a Digital Society

| Time | Margala Hall |
|---|---|
| 3 December 2019<br>9:15am – 11:30am | **Moderator:** Ms Amna Sandhu, SDPI, Islamabad, Pakistan<br>**Welcome Address:** Ambassador Shafqat Kakakhel, Chairperson BoG, SDPI, Islamabad, Pakistan<br>**Introduction:** Dr Abid Q Suleri, Executive Director, SDPI, Islamabad, Pakistan<br>**Keynote Speaker:** Mr Haroon Sharif, Former Chairperson, BoI, GoP<br>**Special Remarks:** Mr George Gu, Managing Director, StarTimes Communication Network Technology, China<br>**Chief Guest:** Mr Asad Umar, Minister for Planning and Special Initiatives, GoP<br>**Guest of Honour:** Dr Aisha Ghaus Pasha, MNA, GoP<br>**Launch of SDPI Publications**<br>1. SDC-SAES Anthology: Corridors of Knowledge for Peace and Development<br>2. Learning and Development<br><br>**Plenary Organisers:** Mr Raja Taimur Hassan &<br>Ms Fatima Khalid, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Mr Raja Taimur Hassan<br>Policy R & LR: Ms Fatima Khalid |
| 11:30am – 12noon | Hi-Tea |

Day 2
3 December 2019
Concurrent Sessions

| | Margala Hall | Sangam Hall | Board Room | Consulate Hall |
|---|---|---|---|---|
| 3 December 2019<br>12:00pm – 2:00pm | **Concurrent Session A-1**<br>**Managing Our Water:**<br>**Collective Action in the Digital Age**<br><br>**Chair:**<br>Mr Riaz Fatyana, Convener Parliamentary Task Force on SDGs, GoP<br><br>**Moderator:**<br>Dr Imran Khalid, SDPI, Islamabad, Pakistan<br><br>**Speakers:**<br>1. Ms Fatima Akhtar, Nestle, Islamabad, Pakistan<br>2. Mr Nadeem Ahmad, WaterAid, Pakistan<br>3. Ms Simi Kamal, PPAF, Islamabad, Pakistan<br>4. Mr Fayyaz Hassan Sipra, COMSATS University, Islamabad, Pakistan<br>5. Mr Basharat Saeed, World Bank, Pakistan Office<br><br>**Panel Organisers:**<br>Dr Imran Khalid & Mr Kashif Salik, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Ms Nudrat Fatima<br>Policy R & LR: Ms Sofia Akram | **Concurrent Session A-2**<br>**Youth and Peace Building in the Digital Age**<br><br>**Moderator:**<br>Dr Nathalene Reynolds, SDPI, Islamabad, Pakistan<br><br>**Introductory Remarks:**<br>Mr Adnan Rafiq, USIP, Pakistan<br><br>**Speakers:**<br>1. Dr Farhan Zahid, Security Analyst, Quetta, Pakistan<br>2. Ms Tuba Azeem, IPS, Islamabad, Pakistan<br>3. Mr Ali Rehmat, SDPI, Islamabad, Pakistan<br>4. Mr Ali Saleem, UN Expert Group on Youth, Peace and Security<br>5. Dr Naeem Ahmed, DoIR, UoK, Karachi, Pakistan<br><br>**Panel Organisers:**<br>Dr Nathalene Reynolds, Ms Rubab Syed, Ms Rabia Tabassum & Mr Shahbaz Tufail, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR & LR: Mr Raja Waheed Ashraf<br>Policy R: Ms Rabia Tabassum, SDPI & Mr Raja Waheed Ashraf | **Concurrent Session A-3**<br>**Emerging Technologies and Regional Stability**<br><br>**Chair:**<br>Air Chief Marshal (Retd.) Kaleem Saadat, President, CASS, Islamabad, Pakistan<br><br>**Guest of Honour:**<br>Gen. (Retd.) Samrez Salik, Islamabad, Pakistan<br><br>**Moderator:**<br>Mr Shahid Minhas, SDPI, Islamabad, Pakistan<br><br>**Speakers:**<br>1. Dr Sylvie Mattely, IRIS, France<br>2. Mr Ejaz Haider, Indus News, Lahore, Pakistan<br>3. Mr Usama Nizamani, Junior Consultant, IPRI, Islamabad, Pakistan<br><br>**Panel Organisers:**<br>Ms Rabia Tabassum, Ms Ifra Baig & Mr Shahid Minhas, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Ms Huzaifa Rana, SDPI<br>Policy R & LR: Mr Ahmad Raza | **Concurrent Session A-4**<br>**Technology and Labour Market:**<br>**Preparing Pakistan for the Future**<br><br>**Chair & Special Remarks:**<br>Dr Amitabh Kundu, RIS, India<br><br>**Speakers:**<br>1. Ms Ingrid Christensen, ILO, Pakistan Office<br>2. Mr Malik Zahoor Awan, Pakistan Workers Federation, Pakistan Office<br>3. Mr Saleem Qureshi, Haier Labs, Karachi, Pakistan<br>4. Dr Talat Mahmood, Germany<br>5. Dr Nasir Khan, NAVTTC, Pakistan<br><br>**Panel Organisers:**<br>Dr Sajid Amin & Ms Fareeha Armughan, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR & Policy R: Ms Fareeha Armughan, SDPI & Ms Iqra Khalid<br>LR: Ms Iqra Khalid |

| 2:00pm – 3:00pm | Lunch | | | |
|---|---|---|---|---|
| | **Margala Hall** | **Sangam Hall** | **Board Room** | **Consulate Hall** |
| 3 December 2019<br>3:00pm – 5:00pm | **Concurrent Session A-5**<br>**Scope of Quality Education in a Digital Society**<br><br>**Chair**:<br>Dr Fateh Marri, ED, HEC, Pakistan<br><br>**Discussant**:<br>Dr Nasir Mehmood, AIOU, Islamabad, Pakistan<br><br>**Speakers:**<br>1. Prof. Giovanni Abramo, IASI-CNR, Italy<br>2. Dr Afshan Huma, AIOU, Islamabad, Pakistan<br>3. Ms Deepthi Bandara, QAAC, Sri Lanka<br>4. Mr Qaiser A. Raja, Skill Development Academy, UK<br><br>**Panel Organisers:**<br>Mr Shahid Minhas, Ms Sadia Satti, SDPI, Islamabad & Higher Education Commission, Pakistan<br><br>**Rapporteurs**:<br>PR & LR: Mr Sheikh Abdullah<br>Policy R: Mr Arsal Illahi | **Concurrent Session A-6**<br>**Women Entrepreneurs in a Digital Society**<br><br>**Moderator:**<br>Dr Rajan Ratna, UNESCAP, India<br><br>**Guest of Honour**:<br>Ms Shandana Gulzar Khan, MNA, GoP<br><br>**Speakers**:<br>1. Ms Masarrat Misbah, Depilex, Lahore, Pakistan<br>2. Ms Romela Hamid, SMT, Islamabad, Pakistan<br>3. Ms Amna Zafar, Check Box Media, Islamabad, Pakistan<br>4. Ms Nataliya Khan, Photographer, US<br><br>**Panel Organisers:**<br>Ms Samavia Batool & Mr Mobeen Ali Khan, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs**:<br>PR & Policy R: Ms Samavia Batool, SDPI<br>LR: Mr Muhammad Awais Bhatti | **Concurrent Session A-7**<br>**Strengthening the Use of Evidence in Policymaking for Development Impact**<br><br>**Chair:**<br>Mr Sartaj Aziz, Former Foreign Minister, GoP<br><br>**Moderator**:<br>Ms Mehr Shah, Karandaaz, Islamabad, Pakistan<br><br>**Discussants**:<br>1. Mr Andy Murray, DFID<br>2. Ms Safiya Aftab, Verso Consulting (Pvt) Ltd. Islamabad, Pakistan<br>3. Dr Arnaldo Pellini, ODI, UK<br><br>**Speakers**:<br>1. Mr Mosharraf Zaidi, Tabadlab, Islamabad, Pakistan<br>2. Mr Anees Jillani, SPARC, Islamabad, Pakistan<br>3. Dr Vaqar Ahmed, SDPI, Islamabad, Pakistan<br><br>**Panel Organisers:**<br>Mr Qasim Shah, Ms Mahnoor Arshad & Mr Ahmed Khaver, SDPI, Islamabad, Pakistan<br><br>**Rapporteur:**<br>PR, Policy R & LR: Mr Ahmed Khaver, SDPI | **Concurrent Session A-8**<br>***Roundtable* - Air Pollution: Addressing Data Challenges and the Way Forward**<br><br>**Moderator:**<br>Ms Maryam Shabbir, SDPI, Islamabad, Pakistan<br><br>**Guest of Honour**:<br>Ms Zartaj Gul, Minister of State for Climate Change, GoP<br><br>**Panellists:**<br>1. Ms Maryam Abbasi, SDPI, Islamabad, Pakistan<br>2. Ms Zainab Naeem & Ms Nageen Sohail, FJWU, Rawalpindi, Pakistan<br>3. Mr Abid Omar, Pakistan Air Quality Initiative, Karachi, Pakistan<br><br>**Discussants**<br>1. Mr Muhammad Khan, Balochistan EPA, GoP<br>2. Mr Amin Baig, Punjab EPA, GoP<br>3. Dr Imran Khalid, SDPI, Islamabad, Pakistan<br><br>**Panel Organiser:**<br>Ms Maryam Shabbir, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Ms Huzaifa Shabbir<br>Policy R & LR: Ms Khaansa Naeem |

| Day 2<br>3 December 2019<br>Engro - SDPI Dinner Plenary - Renewable Energy Reforms in Pakistan: An Appraisal | |
|---|---|
| **Serena Hotel** | |
| 3 December 2019<br>6:00pm – 9:00pm | **Moderator and Welcome Remarks:**<br>Engr Ahad Nazir, SDPI, Islamabad Pakistan<br><br>**Guest of Honour:**<br>Senator Shibli Faraz, Leader of the House, Senate of Pakistan<br><br>**Introduction to SDC:**<br>Dr Abid Q Suleri, Executive Director, SDPI, Islamabad, Pakistan<br><br>**Panellists:**<br>1. Dr Rana Abdul Jabbar Khan, CEO, Alternate Energy Development Board<br>2. Mr Shahab Qadir, CEO, Engro Powergen Qadirpur Limited<br>3. Dr Fatima Khushnud, IPPA, Islamabad, Pakistan<br>4. Mr Sardar Muhazzam, MD, NEECA<br><br>**Plenary Organisers:**<br>Mr Ahad Nazir, SDPI, Islamabad, Pakistan &<br>Mr Mujeeb ur Rehman<br><br>**Rapporteurs:**<br>PR: Mr Raja Taimur Hassan, SDPI<br>Policy R & LR: Mr Daheem Hayat, IPPA |

Day 3
4 December 2019
Concurrent Sessions

| Time | Margala Hall | Board Room | Sangam Hall | Consulate Hall |
|---|---|---|---|---|
| 4 December 2019<br>9:30am – 11:30am | **Concurrent Session B-1**<br>**Digitalising Inclusion and Social Protection in Pakistan**<br>**Chair**:<br>Mr Pervez Iftikhar, Member PM Task Force on IT, Islamabad, Pakistan<br>**Technical Presentation**:<br>Mr Syed Muhammad Mustafa, GIZ Pakistan<br>**Panellists**:<br>1. Mr Ahmed Qadir, CCP, Islamabad, Pakistan<br>2. Dr Sajid Amin, SDPI, Islamabad, Pakistan<br>**Panel Organisers:**<br>Ms Mahnoor Arshad & Dr Vaqar Ahmed, SDPI, Islamabad, Pakistan<br>**Rapporteurs**:<br>PR & Policy R: Mr Aala Shan<br>LR: Ms Mahnoor Arshad | **Concurrent Session B-2**<br>**Ecological Transition to Sustainable Societies in a Digital Era: CPEC Perspective**<br>**Chair**:<br>Ms Kanwal Shauzeb, Parliamentary Secretary, MPDR<br>**Moderator:**<br>Dr Hina Aslam, SDPI, Islamabad, Pakistan<br>**Special Remarks:**<br>Mr Hassan Daud, Chairman BoI, KP, Pakistan<br>**Speakers**:<br>1. Dr Huan Liu, Tsinghua University, China<br>2. Dr Muhammad Imran Khan, UAF, Pakistan<br>3. Mr Xiaofei Wang, GEIDCO, China<br>4. Mr Sudheendra Kulkarni, Columnist, India<br>**Panel Organisers:**<br>Dr Hina Aslam & Ms Sana Malik, SDPI, Islamabad, Pakistan<br>**Rapporteurs**:<br>PR & Policy R: Mr Raja Waheed Ashraf & Ms Numra Abid<br>LR: Ms Numra Abid | **Concurrent Session B-3**<br>**Governance and Accountability of State Institutions and Officials in a Digitalised World: Case of Pakistan**<br>**Chair**:<br>Barrister Shehzad Akbar, Special Assistant on Accountability to PM, GoP<br>**Moderator:**<br>Mr Fayyaz Yasin, Accountability Lab, Islamabad, Pakistan<br>**Discussant**:<br>Ms Nataliya Tariq, APC, Islamabad, Pakistan<br>**Speakers:**<br>1. Mr Shahid Faaruq, UNDP, Lahore, Pakistan<br>2. Dr Mansoor Ali Zaidi, NUML University, Islamabad, Pakistan<br>3. Mr Muhammad Aftab Alam, IRADA, Islamabad, Pakistan<br>4. Dr Arnaldo Pellini, ODI, Tampere, Finland<br>**Panel Organisers:**<br>Mr Raja Taimoor Hassan & Ms Rubab Syed, SDPI, Islamabad, Pakistan<br>**Rapporteurs**:<br>PR & Policy R: Mr Raja Taimur Hassan & Ms Rameen Mufti<br>LR: Mr Arsal Illahi | **Concurrent Session B-4**<br>**Managing Mental Health in a Digitalised Society**<br>**Chair:**<br>Dr Nausheen Hamid, Parliamentary Secretary, Health Reforms, Islamabad, Pakistan<br>**Moderator**:<br>Ms Ifra Baig, SDPI, Islamabad, Pakistan<br>**Special Remarks:**<br>1. Dr Saima Hamid, VC, FJWU, Rawalpindi, Pakistan<br>2. Dr Mehtab Karim, Rector University of Malir, Karachi, Pakistan<br>**Speakers**:<br>1. Dr Shakil Malik, Professor of Psychiatry, UK *via Skype*<br>2. Dr Faryal Razzak, The FEEEL Pvt. Ltd, Islamabad, Pakistan<br>3. Dr Semra Salik, Psychecare, Islamabad, Pakistan<br>4. Dr Wahab Yousafzai, Shifa International Hospital, Islamabad, Pakistan<br>5. Dr Zarqa Taimur, Islamabad, Pakistan<br>**Panel Organisers:**<br>Ms Sana Malik, Mr Moazzam Bhatti & Mr Shahid Minhas, SDPI, Islamabad, Pakistan<br>**Rapporteurs**:<br>PR & Policy R: Ms Sana Malik & Ms Nimra Ashfaq<br>LR: Ms Nimra Ashfaq |
| 11:30am – 12:00pm | Tea | | | |

| | Margala Hall | Board Room | Sangam Hall | Consulate Hall |
|---|---|---|---|---|
| 4 December 2019<br>12:00pm – 2:00pm | **Concurrent Session B-5**<br>**Towards a Digital-ready Workforce**<br><br>**Chair**:<br>Ms Ghazala Saifi, Parliamentary Secretary, Islamabad, Pakistan<br><br>**Moderator**:<br>Mr Abdul Qadir, FES Pakistan<br><br>**Speakers:**<br>1. Mr Navam Niles, CEPA, Sri Lanka<br>2. Dr Paras Kharel, SAWTEE, Nepal<br>3. Ms Hussan Bano Burki, Chief of Party, USAID-PRIEA, Islamabad, Pakistan<br>4. Mr Ather Jameel, Centre for Labour Research, Islamabad, Pakistan<br><br>**Panel Organisers:**<br>Mr Abdul Qadir, FES & Dr Vaqar Ahmed & Mr Asif Javed, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs**:<br>PR & Policy R: Mr Asif Javed & Ms Alishba Naeem<br>LR: Ms Alishba Naeem | **Concurrent Session B-6**<br>**Cyber Security and Cyber Crime in a Digital Society**<br><br>**Moderator**:<br>Brig. Mohammad Yasin (Retd.), SDPI, Islamabad, Pakistan<br><br>**Chair & Guest of Honour**:<br>Ms Khawar Mumtaz, Former Chairperson NCSW, Islamabad, Pakistan<br><br>**Speakers:**<br>1. Ms Zaheema Iqbal, NIMA, Islamabad, Pakistan<br>2. Dr Rafi us Shan, KP CERC, KPITB Khyber Pakhtunkhwa, GoP<br>3. Mr Rafay Baloch, PTA, GoP<br>4. Mr Nahil Mahmood DeltaTech, Islamabad, Pakistan *via Skype*<br>5. Dr Syed Hussain Shaheed Soherwordi, University of Peshawar, Pakistan<br><br>**Panel Organisers:**<br>Brig. Mohammad Yasin (Retd.), Mr Hassan Murtaza, & Ms Imrana Niazi, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs**:<br>PR: Mr Ahmed Khaver<br>Policy R: Ms Rimsha Khan<br>LR: Ms Anam Masood | **Concurrent Session B-7**<br>**Opening up Spaces for Transgender Community in a Digital Era**<br><br>**Chair**:<br>Mr Qibla Ayaz, CII, Islamabad, Pakistan<br><br>**Moderator**:<br>Ms Rubab Syed, SDPI, Islamabad, Pakistan<br><br>**Study Presentation:**<br>Mr Abdul Rasheed, CII, Islamabad, Pakistan<br><br>**Speakers**:<br>1. Ms Moon Ali, KSS, Lahore, Pakistan<br>2. Ms Alisha Shah, UNDP, Islamabad, Pakistan<br>3. Ms Zari, Wajood Organization, Rawalpindi, Pakistan (video)<br><br>**Panel Organisers:**<br>Dr Nathalene Reynolds & Ms Hania Shah, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs**:<br>PR: Ms Ayesha Ilyas<br>Policy R & LR: Ms Ayesha Aziz | **Concurrent Session B-8**<br>**Governing Pakistan's Water Economy in the 21st Century**<br><br>**Moderator:**<br>Dr Imran Khalid, SDPI, Islamabad, Pakistan<br><br>**Technical Presentation:**<br>Mr Mehr Ali Shah, Ministry of Water Resources, GoP<br><br>**Panellists**:<br>1. Ambassador Shafqat Kakakhel, Former Assistant Secretary General, UN & BoG, SDPI, Islamabad, Pakistan<br>2. Mr Ashfaq Mahmood, Former Secretary, Ministry of Water and Power, GoP<br>3. Prof. Dr Shaheen Akhtar, NDU, Islamabad, Pakistan<br>4. Mr Ahmad Rafay Alam, Environmental Lawyer, Lahore, Pakistan<br><br>**Panel Organisers:**<br>Dr Imran Khalid & Mr Kashif Salik, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR & Policy R: Ms Aiza Zafar & Ms Sofia Akram<br>LR: Ms Sofia Akram |
| 2:00pm – 3:00pm | Lunch | | | |

| | Margala Hall | Sangam Hall | Board Room | Consulate Hall |
|---|---|---|---|---|
| 4 December 2019<br>3:00pm – 5:00pm | **Concurrent Session B-9 (3-6pm)**<br>**Promoting Regional Cooperation in South Asia for Achieving SDGs**<br><br>**Moderator**:<br>Dr Rajan S Ratna, Economic Affairs Officer UNESCAP-SSWA, India<br><br>**Panellists:**<br>1. Dr Abid Q Suleri, SDPI, Islamabad, Pakistan<br>2. Mr Abdul Basir Azimi, Biruni Institute, Afghanistan<br>3. Dr Amitabh Kundu, RIS, India<br>4. Dr Fatemeh Chemali Chirani, Social Scientist, Islamabad, Pakistan<br>5. Ms Sofoora Kawsar Usman, Ministry of Health, Maldives<br>6. Dr Posh Raj Pandey, SAWTEE, Nepal<br>7. Ms Hasna Munas, Verité Research, Sri Lanka<br><br>**Snapshot of the EIF-UNESCAP Initiatives (5-6pm)**<br>1. Ms Shandana Gulzar Khan, MNA, GoP<br>2. Dr Rajan S Ratna, UNESCAP-SSWA, India<br>3. Dr Abid Q Suleri, SDPI, Islamabad, Pakistan<br>4. Ms Naima Ansari, CEO, Innovations, Pakistan<br>5. Ms Shireen Arshad Khan, SAWDF, Lahore, Pakistan<br>6. Ms Fizza Mumtaz, Islamabad, Pakistan<br><br>**Panel Organisers:**<br>UNESCAP & Ms Hania Shah, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs**:<br>PR & Policy R: Mr Muhammad Aala Shan<br>LR: Ms Hania Shah, SDPI | **Concurrent Session B-10**<br>**Human Rights Movements and Digital Activism**<br><br>**Chair**:<br>Ms Ayesha Raza Farooq, Senator, GoP<br><br>**Moderator**:<br>Ms Ayesha Ilyas, SDPI, Islamabad, Pakistan<br><br>**Guest of Honour**:<br>Dr Shireen Mazari, Federal Minister of Human Rights, GoP<br><br>**Special Remarks**:<br>Mr I.A. Rehman, Human Rights Activist, Lahore, Pakistan<br><br>**Speakers**:<br>1. Ms Ruwa Altaf Shah, Journalist, Turkey<br>2. Ms Inshah Malik, Kardan University, Afghanistan<br>3. Dr Nathalene Reynolds, SDPI, Islamabad, Pakistan<br>4. Mr Michael Meyer, DRI, Germany *via Skype*<br>5. Ms Nighat Dad, DRF, Lahore, Pakistan<br>6. Mr Saroop Ijaz, HRW, Islamabad, Pakistan<br><br>**Panel Organisers:**<br>Ms Ayesha Ilyas, Dr Shafqat Munir & Ms Hania Shah, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs**:<br>PR & Policy R: Mr Ali Rehmat<br>LR: Mr Ali Rehmat & Mr Sawal Baig | **Concurrent Session B-11**<br>**SDGs Integration in Pakistan: Challenges, Opportunities and Learning from the Region**<br><br>**Chair**:<br>Ms Shaista Parvaiz Malik, MNA, GoP<br><br>**Moderator:**<br>Ms Amna Sandhu, SDPI, Islamabad, Pakistan<br><br>**Speakers:**<br>1. Mr Shoaib Sultan Khan, NRSP, Islamabad, Pakistan<br>2. Mr Shakeel Ahmad, UNDP, Thailand *via Skype*<br>3. Ms Amina Khan, ODI, UK<br>4. Mr Shahid Naeem, Planning Commission, GoP<br>5. Mr Amer Durrani, Reenrgia, Islamabad, Pakistan<br><br>**Panel Organisers:**<br>Dr Vaqar Ahmed & Ms Amna Sandhu, SDPI, Islamabad, Pakistan & Mr Umer Akhlaq, UNDP<br><br>**Rapporteurs:**<br>PR & Policy R: Mr Hassan Rasheed<br>LR: Ms Zobaria Zafar | **Concurrent Session B-12**<br>**Pakistan Economy: Stabilisation with a Human Face**<br><br>**Moderator**:<br>Dr Nadia Farooq, ADB, Pakistan<br><br>**Welcome Remarks**:<br>Dr Jochen Hippler, Country Director, FES, Islamabad, Pakistan<br><br>**Keynote Address**:<br>Dr Hafeez A. Pasha, former Federal Minister for Finance, GoP<br><br>**Speakers:**<br>1. Dr Gonzalo Varela, Trade Economist, World Bank Group<br>2. Dr Pervez Tahir, Bank of Punjab, Lahore, Pakistan<br><br>**Panel Organisers:**<br>Mr Abdul Qadir, FES & Dr Vaqar Ahmed & Mr Maaz Javed, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs**:<br>PR & Policy R: Ms Huzaifa Rana<br>LR: Ms Khadija-tul-Kubra |

| Day 3<br>4 December 2019<br>Consulate Hall | |
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| 4 December 2019<br>5:15pm – 7:15pm | **Session B- 13**<br>**Innovative Solutions towards Delivery of SDGs**<br><br>**Moderator**:<br>Mr Ahmed Khaver, SDPI, Islamabad, Pakistan<br><br>**Panellists**:<br>1. Dr Saira Ahmed, CUST, Islamabad, Pakistan<br>2. Dr Tariq Ahmad, BUITEMS, Quetta, Pakistan<br>3. Mr Dan Gregory, ISD, UK<br>4. Mr Ali Jaswal, Xinhua News Agency, Islamabad, Pakistan<br>5. Mr Ali Kamal, UNDP Pakistan<br>6. Dr Usman Mustafa, PIDE, Islamabad, Pakistan<br>7. Mr Maaz Javed, SDPI, Islamabad, Pakistan<br>8. Mr Ruwan Samaraweera, IPS, Sri Lanka<br><br>**Panel Organisers**:<br>Dr Vaqar Ahmed &<br>Mr Maaz Javed, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs**:<br>PR & Policy R: Mr Maaz Javed, SDPI & Mr Raja Waheed Ashraf<br>LR: Mr Raja Waheed Ashraf |

| Day 3<br>4 December 2019<br>HEC Education Dinner Gala: Promoting Higher Education Quality through Policies and Practices | |
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| **Serena Hotel** | |
| 4 December 2019<br>7:00pm – 9:00pm | **Chief Guest:**<br>Mr Fawad Chaudhry, Federal Minister for Science and Technology, GoP<br><br>**Guest of Honour:**<br>Prof Ahsan Iqbal, Former Minister for Interior and Planning Commission, GoP<br><br>**Chair:**<br>Dr Tariq Banuri, Chairperson, HEC, Islamabad, Pakistan<br><br>**Moderator & Discussant:**<br>Dr Abid Q Suleri, SDPI, Islamabad, Pakistan<br><br>**Distinguished Panellists:**<br>1. Ms Firdous Ashiq Awan, Special Assistant to the Prime Minister for Information and Broadcasting, GoP<br>2. Mr Taj Haider, founding Member PPP, Islamabad, Pakistan<br>3. Ms Rita Akhtar, Country Head, USEFP, Islamabad, Pakistan<br>4. Dr Mustafa Gillani, Former VC, University of Peshawar, Peshawar, Pakistan<br><br>**Plenary Organisers:**<br>Mr Shahid Minhas &<br>Ms Sadia Satti, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Mr Raja Taimur Hassan, SDPI<br>Policy R & LR: Mr Ahmad Raza |

Day 4
5 December 2019
Concurrent Sessions

| Time | Margala Hall | Sangam Hall | Board Room | Consulate Hall |
|---|---|---|---|---|
| 5 December 2019<br>9:30am – 11:30am | **Concurrent Session C-1**<br>**Leaving No One Behind in the Skills Development Agenda in Pakistan**<br><br>**Guest of Honour:**<br>Ms Ghazala Saifi, Parliamentary Secretary, GoP<br><br>**Moderator:**<br>Dr Zubair Iqbal Ghauri, Visiting Fellow, SDPI, Islamabad, Pakistan<br><br>**Discussant:**<br>Mr Muqeem-ul-Islam, NAVTTC, Islamabad, Pakistan<br><br>**Speakers:**<br>1. Ms Ellen Van, UNICEF Pakistan<br>2. Ms Amina Khan, ODI, UK<br>3. Mr Osman Anwar, VIAMO<br>4. Ms Farhana Asad, The Lel Collection, Islamabad, Pakistan<br><br>**Panel Organisers:**<br>Mr Mobeen Ali & Mr Asif Javed, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Mr Raja Taimur Hassan, SDPI &<br>Mr Muhammad AalaShan<br>Policy R & LR: Mr Arsalan Ahmed Raja | **Concurrent Session C-2**<br>**Ecofeminism in South Asian Literature in a Digital Society**<br><br>**Chair:**<br>Ms Khawar Mumtaz, Former Chairperson, NCSW, Lahore, Pakistan<br><br>**Discussant:**<br>Ms Syeda Yamna Hasany, Radio Pakistan<br><br>**Speakers:**<br>1. Ms Nusrat Zehra, ICF, Karachi, Pakistan<br>2. Dr Humera Ishfaq, China *via Skype*<br>3. Ms Zhou Yuam, China *via Skype*<br>4. Mr Raza Naeem, Progressive Writers' Association, Lahore, Pakistan<br><br>**Panel Organisers:**<br>Mr Ahmad Salim, Dr Humaira Ishfaq & Ms Ayesha Ilyas, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR & Policy R: Ms Hania Shah, SDPI<br>LR: Ms Ayesha Ilyas, SDPI | **Concurrent Session C-3**<br>***Podium Discussion* - Digital Financial Inclusion: Challenges and Opportunities**<br><br>**Chair:**<br>Syed Naveed Qamar, MNA, GoP<br><br>**Moderator:**<br>Dr Safdar Sohail, Special Secretary Cabinet, GoP<br><br>**Guest of Honour:**<br>Mr Nadeem Hussain, Founder & Coach, Planet N Group of Companies, Karachi, Pakistan<br><br>**Distinguished Panellists:**<br>1. Syed Sohail Javaad, State Bank of Pakistan, Karachi, Pakistan<br>2. Dr Shahbaz Nasir, PTA, Islamabad, Pakistan<br>3. Mr M. Ali Kemal, Planning Commission, GoP<br>4. Ms Fareeha Armughan, SDPI, Islamabad, Pakistan<br><br>**Panel Organisers:**<br>Dr Sajid Amin, Ms Amna Sandhu & Ms Fareeha Armughan, SDPI, Islamabad, Pakistan<br><br>**Rapporteur:**<br>PR, Policy R & LR: Ms Nudrat Fatima | **Concurrent Session C-4**<br>**Promises of the Graphic Health Warning (GHW) in Tobacco Control Regime and the Perils of Tobacco Pandemic: The Way Forward**<br><br>**Chair:**<br>Dr Nausheen Hamid, Parliamentary Secretary for Health, GoP<br><br>**Moderator & Opening Comments:**<br>Mr Syed Ali Wasif Naqvi, SDPI, Islamabad, Pakistan<br><br>**Speakers:**<br>1. Mr Nadeem Iqbal Javed, NCRP, Islamabad, Pakistan<br>2. Dr Minhaj us Siraj, Tobacco Control Cell, GoP<br>3. Mr Waseem Iftikhar Janjua, SDPI, Islamabad, Pakistan<br><br>**Panel Organisers:**<br>Mr Waseem Iftikhar Janjua & Mr Syed Ali Wasif Naqvi, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Ms Noorulain Amajd<br>Policy R: Mr Wasif Naqvi, SDPI &<br>Ms Zareen Afzal<br>LR: Ms Zareen Afzal |
| 11:30am – 12:00pm | Tea | | | |

| Time | Margala Hall | Sangam Hall | Board Room | Consulate Hall |
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| 5 December 2019<br>12:00pm – 2:00pm | **Concurrent Session C-5**<br>**Ease of Doing Business in Pakistan: A Case for Tax Harmonisation**<br><br>**Chair:**<br>Mr Shabbar Zaidi, Chairman, FBR, GoP<br><br>**Moderator:**<br>Engr Ahad Nazir, SDPI, Islamabad, Pakistan<br><br>**Agenda Setting:**<br>Engr Ahad Nazir, SDPI, Islamabad, Pakistan<br><br>**Discussants**<br>1. Dr Muhammad Irshad, Former Chairman FBR, GoP<br>2. Mr Zain ul Abedin Sahi, PRA, Lahore, Pakistan<br>3. Engr M. A. Jabbar Memon, Senior Business Leader, Karachi, Pakistan<br>4. Mr Shabih Ali Mohib, World Bank Pakistan Office<br>5. Ms Hina Shahrukh, ICAP, Islamabad, Pakistan<br><br>**Panel Organisers:**<br>Mr Robert Carl Michael Beyer, World Bank & Mr Ahad Nazir, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Mr Raja Taimur Hassan<br>Policy R & LR: Ms Iqra Khaliq | **Concurrent Session C-6**<br>**Endangered South Asian Languages in a Digital Age**<br><br>**Chair:**<br>Mr I.A. Rehman, Former Director, HRCP, Lahore, Pakistan<br><br>**Guest of Honour:**<br>Mr Afrasiab Khattak, Former Senator, GoP<br><br>**Discussant:**<br>Mr Mazhar Arif, SAMR, Islamabad, Pakistan<br><br>**Speakers:**<br>1. Mr Ahmad Salim, SDPI, Islamabad, Pakistan<br>2. Mr Zubair Torwali, IBT, Swat, Pakistan<br>3. Mr Muhammad Zaman Sagar, FLI, Islamabad, Pakistan<br>4. Mr Niaz Nadeem, ICF, Islamabad, Pakistan<br>5. Mr Sudheendra Kulkarni, India<br><br>**Panel Organisers:**<br>Mr Ahmad Salim, Dr Humaira Ishfaq & Ms Ayesha Ilyas, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Ms Samavia Batool & Mr Ali Rehmat, SDPI<br>Policy R & LR: Ms Aiza Zafar | **Concurrent Session C-7**<br>***Roundtable* - Role of Women in Media in a Digital Society**<br><br>**Moderator:**<br>Mr Badar Alam, SDPI, Islamabad, Pakistan<br><br>**Speakers:**<br>1. Ms Tasneem Ahmer, Uks Research Centre, Pakistan<br>2. Dr Nathalene Reynolds, SDPI, Islamabad, Pakistan<br>3. Ms Amber Rahim Shamsi, Journalist, Islamabad, Pakistan<br>4. Dr Fatemeh Chemali Chirani, Social Scientist, Islamabad, Pakistan<br>5. Ms Ruwa Altaf Shah, Journalist, Turkey<br>6. Mr Rudra Bahadur Khadka, Nagarik National Daily, Nepal<br>7. Ms Asma Sherazi, Journalist, Islamabad, Pakistan<br><br>**Panel Organisers:**<br>Ms Maryam Shabbir & Mr Badar Alam, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Ms Huzaifa Shabbir<br>Policy R & LR: Ms Fatima Khalid, SDPI | **Concurrent Session C-8**<br>**Achieving Food Security in Digitalised World**<br><br>**Chair:**<br>Ms Androulla Kaminara, Head of the Delegation of the European Union to Pakistan<br><br>**Moderator:**<br>Dr Qamar Uz Zaman, VC, Pir Mehr Ali Shah University of Arid Agriculture, Rawalpindi, Pakistan<br><br>**Discussants:**<br>1. Dr Muhammad Saeed, PMAS-AAU, Rawalpindi, Pakistan<br>2. Mr Ruwan Samaraweera, IPS, Sri Lanka<br><br>**Speakers:**<br>1. Dr Babar Shahbaz, UAF, Pakistan<br>2. Dr Arnold Elepano, College of Engineering and Agro-Industrial Technology University of the Philippines Los Banos *via Skype*<br>3. Prof. Dr Allah Bakhsh, UAF, Pakistan<br>4. Dr Malik Jahan Khan, Namal Institute, Mianwali, Pakistan<br>5. Dr Muhammad Jehanzeb Masud Cheema, PMAS-AAU, Rawalpindi, Pakistan<br><br>**Panel Organisers:**<br>Mr Qasim Shah & Mr Hassan Murtaza, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Mr Kamran Khan & Mr Hassan Murtaza, SDPI<br>Policy R & LR: Ms Rimsha Khan |
| 2:00pm – 3:00pm | Lunch | | | |

Day 4
5 December 2019
Closing Plenary
Living Legends of Pakistan Plenary: Life and Work of Dr Syed Babar Ali (OBE)

| Time | Margala Hall |
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| 5 December 2019<br>3:00pm – 5:00pm | **Moderators:**<br>Dr Abid Q Suleri & Ms Maryam Shabbir, SDPI, Islamabad, Pakistan<br><br>**Welcome Address:**<br>Ambassador Shafqat Kakakhel, Chairperson BoG, SDPI, Islamabad, Pakistan<br><br>**Summary of 22nd SDC 2019 & About Living Legends of Pakistan Plenary:**<br>Dr Abid Q Suleri, Executive Director, SDPI, Pakistan<br><br>**Remarks:**<br>1. Mr Sartaj Aziz, Former Deputy Chairman, Ministry of Planning, Development & Reform, GoP<br>2. Dr Parvez Hassan, Senior Advocate, Supreme Court, Lahore, Pakistan<br>3. Ms Khawar Mumtaz, Former Chairperson NCSW, Lahore, Pakistan<br>4. Prof. Dr Khalid Hamid Sheikh, Former VC, University of the Punjab, Lahore, Pakistan<br>5. Mr Shahid Hussain, CEO, Service Sales Corporation (Private) Limited, Lahore, Pakistan<br>6. Dr Tariq Banuri, Chairperson, HEC, Islamabad, Pakistan<br>7. Mr Shamim Ahmad Khan, Former Secretary of Commerce, GoP<br>8. Mr Abdul Razak Dawood, Advisor to PM for Commerce, Textile, Industry and Production, and Investment of Pakistan, GoP<br>9. Mr Shoaib Sultan Khan, NRSP, Islamabad, Pakistan<br><br>**Concluding Remarks by Guest of Honour:**<br>Dr Syed Babar Ali, Businessman, Philanthropist, Educationist, Founder Lahore University of Management Sciences, Lahore, Pakistan<br><br>**Presentation of SDPI Publications**<br>SDC-SAES Anthology: 'Corridors of Knowledge for Peace and Development'<br><br>**Vote of Thanks**<br><br>**SDPI Group Photograph & Refreshments**<br><br>**Plenary Organisers**:<br>Mr Wasif Naqvi &<br>Ms Tayyaba Hanif, SDPI, Islamabad, Pakistan<br><br>**Rapporteurs:**<br>PR: Mr Raja Taimur Hassan & Mr Muhammad AalaShan<br>LR: Mr Muhammad AalaShan |

# Abbreviations & Acronyms

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| AIOU | Allama Iqbal Open University |
| APC | Association for Progressive Communication |
| BISP | Benazir Income Support Programme |
| BoG | Board of Governors |
| BoI | Board of Investment |
| BUITEMS | Balochistan University of Information Technology, Engineering, and Management Sciences |
| CAREC | Central Asia Regional Economic Cooperation Program |
| CASS | Centre for Aerospace & Security Studies |
| CCP | Competition Commission of Pakistan |
| CEPA | Centre for Poverty Analysis |
| CII | Council of Islamic Ideology |
| COMSATS | Commission on Science and Technology for Sustainable Development in the South |
| CUST | Capital University of Science and Technology |
| DoIR, UoK | Department of International Relations, University of Karachi |
| DoIR, UoP | Department of International Relations, University of Peshawar |
| DRF | Digital Rights Foundation |
| DRI | Democracy Reporting International |
| EPA | Environmental Protection Agency |
| FBR | Federal Board of Revenue |
| FES | Friedrich-Ebert-Stiftung |
| FJWU | Fatima Jinnah Women University |
| FLI | Forum for Language Initiatives |

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| GEIDCO | Global Energy Interconnection Development and Cooperation Organization |
| GoP | Government of Pakistan |
| HEC | Higher Education Commission |
| HRCP | Human Rights Commission of Pakistan |
| HRW | Human Rights Watch |
| IASI-CNR | Institute for System Analysis and Computer Science, National Research Council of Italy |
| IBT | Idara Baraye Taleem-o-Taraqi |
| ICAP | Institute of Chartered Accountants of Pakistan |
| ICF | Indus Cultural Forum |
| IDRC | International Development Research Centre |
| ILO | International Labor Organization |
| IPPA | Independent Power Producers Association |
| IPRI | Islamabad Policy Research Institute |
| IPS, Pakistan | Institute of Policy Studies |
| IPS, Sri Lanka | Institute of Policy Studies |
| IRADA | Institute for Research, Advocacy and Development |
| IRIS | French Institute for International and Strategic Affairs |
| ISD, UK | International and Sustainable Development, UK |
| IWCCI | Islamabad Women Chambers of Commerce and Industry |
| KPITB | Khyber Pakhtunkhwa Information Technology Board |
| KSS | Khawaja Sira Society |
| MNA | Member National Assembly |
| NCRP | The Network for Consumer Rights Protection |
| NCSW | National Commission on the Status of Women |
| NDU | National Defence University |

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| NIBAF | National Institute of Banking and Finance |
| NIMA | National Institute of Maritime Affairs |
| NRSP | National Rural Support Programme |
| NVTTC | National Vocational and Technical Training Commission |
| ODI | Overseas Development Institute |
| OICCI | Overseas Investors Chamber of Commerce and Industry |
| PBC | Pakistan Business Council |
| PIDE | Pakistan Institute of Development Economics |
| PITB | Punjab Information Technology Board |
| PMAS-AAU | Pir Mehr Ali Shah Arid Agriculture University |
| PPAF | Pakistan Poverty Alleviation Fund |
| PPP | Pakistan Peoples Party |
| PRA | Punjab Revenue Authority |
| PSPA | Punjab Social Protection Authority |
| PTA | Pakistan Telecommunication Authority |
| QAAC | Quality Assurance Accreditation Council, Sri Lanka |
| RIS | Research and Information System for Developing Countries |
| SAMR | Society for Alternative Media and Research |
| SAWDF | South Asian Women Development Forum |
| SAWTEE | South Asia Watch on Trade, Economics and Environment |
| SDPI | Sustainable Development Policy Institute |
| SECMC | Sindh Engro Coal Mining Company |
| SMT | Self- Management Training |
| STCNT | StarTimes Communication Network Technology |

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| UNESCAP-SSWA | United Nations Economic and Social Commission for Asia and the Pacific: Sub-regional Office for South and South-West Asia |
| UNICEF | United Nations Children's Fund |
| UAF | University of Agriculture Faisalabad |
| USEFP | United States Educational Foundation in Pakistan |
| USIP | United States Institute of Peace |
| VC | Vice Chancellor |

The Fourth Industrial Revolution has the ability to influence my mind in a unique way and that has been seen in election processes. It is no longer about faking ballots, it is now about the ability to modify the thinking of a group of people and to use their own biases that make us prone to even a small amount of fake news or overburdening of real news in a certain way that can influence decision-making of humankind.

*- Dr Arif Alvi, President of Pakistan*

This anthology highlights that South Asia, in general and Pakistan, in particular needs to bridge the digital divide by bringing in communities at the peripheries of development into the cyber sphere. Advances in ICT, machine learning, biotechnology, AI, IoT and their convergence require well-thought, evidence-based hard regulation and soft policy initiatives. This also means a paradigm shift in public policy from a focus on efficiency-based skills to a knowledge-based skills model.

Authors warn that the fight against proliferation of emerging disruptive technologies and products is a major challenge for global peace, security and stability. In this regard, the European Union's export control regime to establish common rules between member states may prove useful.

From a political economy lens, the volume recommends the creation of international institutions to effectively manage Global Value Chains and enhance the sustainability of labour as well as regulate their environmental footprint. The discourse in the book also points out that achieving the SDGs would not be possible without resilient and sustainable agricultural sector development that supports local farmers and increases investment in research, technology and market infrastructure. It commends Pakistan's Alternative and Renewable Energy Policy, 2019 aimed at promoting competitive tariffs, efficient and rational decision-making and inclusiveness. But, cautions that there is need to accommodate future energy needs by adopting digital innovations and green technologies.

For a socially responsible digital future, the authors in this volume call for the inclusion of indigenous communities (like those in Gilgit-Baltistan) and safeguarding their traditional rights and common property resources when it comes to ecological conservation efforts and mining projects. It also stresses the importance of strengthening endangered languages of indigenous communities (e.g., in the Northern Areas of Pakistan) for the protection of their rich cultural heritage, identity, history, literature and traditional knowledge.

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