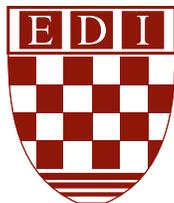


29<sup>th</sup> February - 1<sup>st</sup> March, 2024

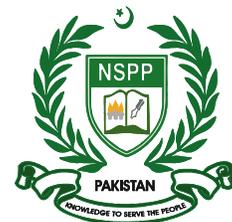
# DIGITISATION & AI

Opportunities and Challenges in View of  
National & International Perspectives

## A Policy Dialogue



Organised By:  
**Executive Development Institute**  
**National School of Public Policy**  
**Government of Pakistan**  
**Lahore**



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## Rector's Message

The National School of Public Policy is the premier national institution for long and short trainings of civil servants as well as executives, academia and social sector professionals in Pakistan. The training methodology of the school as followed by both the Executive Development Institute (EDI) & the National Management College (NMC) aims at fostering an environment of intellectual curiosity amongst participants for analysis and skill enhancement. In addition, through the EDI, NSPP also holds policy dialogues, where experts of the chosen topic come and share their knowledge as well as discussing the issues and way forward related to them. EDI also holds webinars on issues of topical importance.



These functions of EDI help it in fulfilling the overarching aim of the NSPP, which is to improve the quality and effectiveness of public policy formulation and its implementation.

This Dialogue was part of the policy dialogue series conducted through EDI and was considered necessary as the world entered the area of digitisation sometime back and is now at the cusp of the age of Artificial Intelligence. These twin developments have revolutionized the world as we know it. Artificial Intelligence has the potential of offering vast changes. The changes can be good but there are concerns as well. In this fast-changing world, Pakistan is lagging behind even on Digitisation let alone Artificial Intelligence. In Pakistan, the digitalisation ecosystem has not been fully developed yet. It is the need of the hour to create data stacks to effectively integrate emerging technologies in national economy. The rapidly evolving landscape of AI powered cyber threats and the potential loss of jobs in future as a result of AI applications in industry and services require a proactive approach to deal with it. Through imparting right skills in youth and strategic investments in new technologies, Pakistan can unleash potential of its digital economy.

In this background, there are a number of challenges & opportunities which need to be looked into before Pakistan can fully make use of these revolutions and be prepared to deal with these challenges. At EDI, we look at issues from a 360<sup>o</sup> Angle by inviting speakers / experts from Government, Industry and Academia. The policy dialogue was successful in its aim of generating much-needed debate on Data Governance, use of AI and other machine learning tools in education, skills-based job market, issue of cybercrimes and potential for better public service delivery. The sessions led to vibrant discussions and a rich exchange of ideas for formulating concrete recommendations.

The salient points of this critical discourse have been captured along with recommendations in this Report. The Report will hopefully lead to a better understanding and help in policy formulation by various stakeholders.

**Dr. Ijaz Munir**

Rector  
National School of Public Policy

## Executive Summary

The Executive Development Institute (EDI) at National School of Public Policy (NSPP) is a leading public sector institute that conducts policy dialogues, trainings and webinars. EDI always chooses topics of current importance for its policy dialogues and in this regard, it held a Two Days' Policy Dialogue on "Digitisation & AI" on 29<sup>th</sup> February and 1<sup>st</sup> March, 2024. The Government of Pakistan is placing a lot of importance on digitisation, digitalisation and AI tools such as Machine Learning. This has the potential to greatly improve the economic indicators & public service delivery of the country. In this regard, in keeping with EDI's tradition, leading experts from the industry, government/regulatory authorities, social sector and academia were invited to share their knowledge with the participants. At EDI, we carefully choose our topics to cover all the important aspects of a topic/issue. In addition, we sequence our sessions in a way that one session leads to another. During the dialogue, a range of issues were highlighted by the experts & their possible solutions were suggested. The Report captures the gist of their talk, sometimes in their own words and sometimes in paraphrased manner.



In the recent past, technology is fast transforming the world as we know it and to remain at par with the rest of the world, Pakistan also has to adapt to this latest technological revolution. The groundbreaking advancements of the Fourth Industrial Revolution have now evolved into the Fifth Industrial Revolution, driven by AI, IoT, and Robotics. Digital transformation is accelerating through advancements in computing and the Internet of Things (IoTs). Integrating these emerging technologies across all areas of governance, business, and society has become essential for economic progress and efficient governance. Pakistan needs to swiftly embrace these changes, beginning with digitising data. This step is crucial for ensuring interoperability, which is essential for effective digitalisation. The Dean EDI pointed out that advance usage of technology e.g. AI and its tools such as Machine Learning requires data sharing. The speakers pointed out that in Pakistan some areas we have digitised data but in other sectors we lag behind. The government(s) therefore need to take up this challenge on a war footing.

With longer human life expectancies and decreasing technology time spans, individuals may need to adapt three or four technologies in their life spans. The competition to remain valid in the market through skills enhancement is growing. The industry's skill demands have shifted towards data science and machine learning. Machine Learning has brought enormous changes through speech recognition, mapping, industrial robotics, and automated healthcare systems. Many services and industrial tasks which involve humans some years back are now performed with the help of AI applications which is a serious concern for job market.

The skills-based job market demands that we prepare experts and technicians in these new technologies to keep pace with rapid technological evolution. To fill the skill gap, Pakistan needs reforms in the basic education sector, with a strong emphasis on quality STEM (Science, Technology, Engineering, Mathematics) education. Without acquiring these skills, the country will not be able to keep up with the world. At the higher education level, fostering technology transfer initiatives between academia and industry, along with incorporating leading private sector organisations in curriculum development, is essential to prepare the workforce for the evolving job market. AI-based models have also revolutionised the education through personalised learning platforms. However, experts are concerned about maintaining ethical standards in research. This necessitates a robust policy-making approach to develop policies that reflect these changes.

In most of the developed countries, in addition to established industry, their economies are getting boost from startups. *Startups are young companies founded to develop a unique product or service* and are playing an important role in revenue generation, foreign exchange earnings as well as job creation. Different business ideas as startups are providing innovative solutions for food security, business and service industry. However, they require an enabling regulatory and policy environment. Our neighbors like China, India are way ahead of us in this regard. Pakistan must remove barriers hindering startup growth to remain competitive. Connectivity, infrastructure and institutional support should be ensured to make an enabling startup environment.

Another important aspect of maximising the advantages of digitalisation and machine learning tools is through use of financial technologies better known as Fintechs. Financial Startups using the fintech models have revolutionised the payment systems. In Pakistan, through Jazzcash, EasyPaisa, Raast, Nayapay & Sadapay, the number of users availing digital payment facilities have risen sharply. According to one of the speakers, who represented Sate Bank of Pakistan, currently 61% people have digital accounts for payment transfer compared with 16% in 2015. In next 3 to 5 years, it is expected that the ratio will be 90% indicating a financial revolution. However, the growing adoption of financial technologies has made the role of regulatory bodies very crucial to amend and supplement existing acts and update the related policies.

NADRA was among the first citizen identity institutions in the region, issuing vital identification documents and providing verification services for over two decades. However, despite being the first country to issue digital identity, Pakistan couldn't fully utilise this data due to non-sharing across institutions, unlike India, which has successfully implemented the India Stack to enable safe and efficient use of data by some of the businesses and public institutions for various services.

Data security remains a critical issue in Pakistan, where the necessary infrastructure is lacking. Reports of data breaches have frequently surfaced, highlighting the growing risks associated with increased reliance on digital technologies and the expanding volume of data. In Pakistan, both the public and private sectors rely heavily on imported software and hardware for IT infrastructure, posing serious threats to data security. AI-powered cyberattacks present significant challenges to governments worldwide. Pakistan is among the countries where the capability of law enforcement agencies lags behind the rapidly growing threat and complexity of cybercrimes. Prioritising cybersecurity awareness and developing an indigenous hardware industry are essential steps forward. There is an urgent need to invest in the cybercrime wing of the FIA, equipping it with the necessary tools and skillsets to effectively counter the increasing number of cybercrime cases. During the dialogue, it was also highlighted that various public and private organisations including housing societies, take and keep as well as scan CNICs of people entering the housing societies and concern was raised that it can potentially lead to misuse of the personal data.

Till date, there is no law to govern the data sharing among Government institutions for live dashboards and public service delivery. Collection of similar data by different agencies and lack of data quality standards not only add to the financial burden but also affect the decision making at central level. Data Governance Laws by taking into confidence all stakeholders would help in evidence-based policy decision and effective digitalisation of economy.

In the rapidly evolving global landscape, Pakistan must prioritise technological advancements, regulatory updates, and infrastructure improvements, while also addressing the skills gap and fostering innovation through a supportive startup ecosystem.

**Mr. Ahmad Nazir Warraich**  
Dean  
Executive Development Institute  
National School of Public Policy

## Acronyms

CRC	Child Registration Certificate
CRVS	Citizen Registration Vital Statistics
DFS	Digital Financial System
EMI	Electronic Money Issuer
EU	European Union
FBR	Federal Board of Revenue
FIA	Federal Investigation Agency
GDP	Gross Domestic Product
HEC	Higher Education Commission
ICT	Information and Communication Technology
IMF	International Monetary Fund
IoT	Internet of Things
IPO	Initial Public Offering
IT	Information Technology
ITES	Information Technology Enabled Services
KPITB	Khyber Pakhtunkhwa Information Technology Board
ML	Machine Learning
MoITT	Ministry of Information Technology and Telecommunication
NADRA	National Database & Registration Authority
NSF	National Science Foundation
OT	Operational Technology
P & D	Planning and Development
PECA	Pakistan Electronic Crimes Act
PITB	Punjab Information Technology Board
Safron	States and Frontier Regions
SBP	State Bank of Pakistan
SECP	Securities and Exchange Commission of Pakistan
STEM	Science, Technology, Engineering, Mathematics
STP	Science and Technology Park
UC	Union Council
UNHCR	United Nations High Commissioner for Refugees

## Glossary

Big Data	Big data refers to extremely large and diverse collections of structured, unstructured, and semi-structured data that continues to grow exponentially over time.
Blockchain Technology	Advanced database mechanism that allows multiple devices to send and receive information and function in a coordinated manner
ChatGPT	A form of generative AI - a tool that lets users enter prompts to receive humanlike images, text or videos that are created by AI
Cloud Computing	It is the delivery of computing services including servers, storage, databases, networking, software, analytics, and intelligence over the internet ("the cloud") to offer faster innovation, flexible resources, and economies of scale.
Data Analytics	Collecting, formatting, and organisation of data to draw conclusions, make predictions, and drive informed decision making
Data Warehousing	A data management system designed to enable and support business activities, especially analytics. Data warehouses are solely intended to perform queries and analysis and contain large amounts of historical data.
Database	Organized collection of structured information or data stored electronically in computer
Data Stack	It consists of the specific tools that are used to ingest, organize, store, and transform data.
Digi Skills	First Online Training Program by Government of Pakistan to empower the youth with skills that are in-demand in freelance market
Digital Ecosystem	It is complex network of people, businesses, and systems that use technology to interact with one another.
Entrepreneurship	It is the ability and readiness to develop, organise and run a business enterprise, along with any of its uncertainties in order to make a profit.
FinTech	New technology that seeks to improve and automate the delivery and use of financial services
Generative AI	A type of artificial intelligence technology that can produce various types of content, including text, imagery, audio and synthetic data
Incubator	Incubators are entities that offer entrepreneurs guidance, training and resources to materialize their project
Internet of Things (IoTs)	It's a technology that facilitates communication between devices and the cloud
Machine Learning	Discipline of AI that provides machines the ability to automatically learn from data and past experiences to identify patterns and make predictions with minimal human intervention.

Management Information System (MIS)	It's a system that helps organisation to realize maximum benefit from investment in personnel, equipment, and business processes
Operational Technology	Operational technology (OT) is hardware and software that detects or causes a change, through the direct monitoring and/or control of industrial equipment, assets, processes and events
Return on Investment (RoI)	A profitability metric used to calculate profit over investment
Snowball Effect	A situation in which something increases in size or importance at a faster and faster rate
STEM	It is an umbrella term used to group together the distinct but related technical disciplines of science, technology, engineering, and mathematics
Teledensity	Number of telephone / mobile connections in a specific geographic area
Web Mining	The method of searching and extracting knowledge from web document using keywords
Zoom	An application used to connect people for online meetings or webinars

# Why Digitisation is Need of the Hour: Analysing Digital Policy and Digital Transformation in Pakistan

**Mr. Hassan Nasir Jamy** is an officer of Pakistan Administrative Service (PAS) with over 34 years of diverse experience and exposure of the public sector at the federal and provincial levels. Among other positions, he has worked as Federal Secretary of Information Technology and Telecommunication Division, Water Resources Division, Privatization Division/Commission, Aviation Division and Ministry of Climate Change. He has also served in the Petroleum and Water & Power Divisions as an Additional Secretary. He remained a member of Directing Staff at the National School of Public Policy for two years.



Mr. Jamy holds an MBA from Quaid-i-Azam University, Islamabad and a Masters' Degree in Rural Development from University of Sussex, UK. He is also a Hubert H. Humphrey Fellow (in Public Policy) from the University of North Carolina, USA.

Mr. Jamy provided an insightful overview of Pakistan's digital landscape, emphasising the state of the digital ecosystem within the economy. He highlighted the existing gaps in cooperation and collaboration among the public sector, private sector, and academia, underscoring the need for a more integrated approach to drive digital transformation.

## A Shift Towards Digital Transformation

The Federal Secretary stated that technological changes are being held with great speed and countries like

*The digital culture as a result of Covid-19 has now become the new norm*

Pakistan are struggling to catch up the pace. Both public and private sectors strive to perform efficiently, however, the private sector is taking

the lead in digitalisation. In recent years, Covid-19 crisis forced everyone to do work digitally, even people who were not fully aware of it adopted *Zoom* and it has now become a new norm'. Everyone has become comfortable with working online. Therefore, work from home is more convenient and economically viable. Digital

## Benefits of Digital Ecosystem in Economy

The speaker described the concept of *digital ecosystem* in which, all organizational models transform into digital workflows. While discussing the usefulness of digital ecosystem, he noted that digital ecosystem has not been fully developed in Pakistan. Digital

*In Pakistan, digital ecosystem has not been fully developed to the extent where all organisational models transform into digital workflows*

transformation of economy helps in efficient public service delivery. In Punjab, remarkable work has been done so far, that services like birth certificate, death certificate, licensing, registrations are now digital and require less human interaction.

Mr. Jamy apprised that socio-economic inclusion enhances with digitalisation where people have all the information/data, performing tasks and getting outcomes. This digital age is leading towards digital economy, where each process is faster, quicker and transparent. He informed that for inclusion in European Union (EU), there are certain standard requirements for countries in all service delivery aspects i.e. banking, education, health etc. Many countries adapted themselves and reshaped their digital infrastructure to join EU.

*Over the years, oil & aviation enterprises which historically generated the most revenue have been replaced by IT companies*

Technology is directly linked with an increase in GDP, revenue and per capita income. Top global oil & aviation enterprises have been replaced by IT companies over the years. The speaker

highlighted the shift in market capitalisation, noting that today's top ten companies include tech giants like Microsoft, Apple, Amazon, and Google's Alphabet.

## Digital Landscape of Pakistan

He added that as far as digital landscape of Pakistan is concerned, the country is 3<sup>rd</sup> largest in freelancing services across the world and has IT services exports to many countries all over the world.

Mr. Jamy highlighted that local universities produce 70,000 IT graduates annually. However, only about 1,500 to 2,000 of these graduates find formal employment, leaving the majority unemployed. The industry is now seeking skills in areas such as Cisco, Fintech, and AI techniques.

The speaker said that Pakistan's IT exports are expanding, however, most of it comes from private sector. A large number of professionals are doing freelance work and keep their revenue outside the country while bringing in a small amount of money due to certain reservations.

*Professionals retain the majority of their freelance earnings overseas, repatriating only a small fraction due to various concerns*

He stated that 600,000 IT professionals are working in Pakistan, yet not reflected on formal economy. *Teledensity* in the country is 90% which is sizeable. Moreover, Pakistan is 2<sup>nd</sup> most financially attractive market for

*In Pakistan, the Teledensity is 90 %.*

outsourcing of IT services and freelancers raised \$300 million last year. The challenge is to have developed policies that how positive data stacks can be translated into economic contribution. There are several digital transformation

initiatives taken by Government such as Raast, other digital payment channels, NADRA, digital census by Pakistan Bureau of Statistics, Tax Asaan by FBR etc. Government as central regulatory body has to support freelancing sector and advice State Bank to improve financial regulations so that exchange rate minimally affects the revenue of IT freelancers

## Challenges in Digital Ecosystem

According to the speaker, privacy and security are primary challenges. Ensuring data privacy and security in digital ecosystem is really important. To remove bottlenecks of digital ecosystem development; infrastructure, innovation, entrepreneurship, E-governance and IT export promotion are goals to be achieved.

*He cautioned that data privacy and security are primary challenges*

He noted that even in top institutions like HEC, digital culture is lacking, while, local hardware components are controlled by international companies, posing a security risk. Furthermore, the strong digital divide in our country could be bridged through digitalization and the development of a robust digital ecosystem. Mr. Jamy informed that Government has issued National Cyber Security Policy, and Personal Data Protection Bill as measures to tackle cyber security issues. The Draft of National Freelance Facilitation Policy has also been floated.

## Potential of AI in Pakistan's Economy

The speaker stated that in January 2024, IT exports witnessed an increase in volume. The exports can be increased further with inclusion of emerging AI technologies. All sectors should cooperate rather than competing with each other. Government departments should work closely with the private sector. National Incubation Centers (NICs) should become hub of innovations.

He said that the idea of *Bikea* came out from one the NICs and now it is earning \$40 million. IT export and e-commerce have potential to increase market capitalisation many folds. At present, digitalisation is happening at various levels e.g. e-office, citizen portals, digital banking, digitized land records, safe city project, online businesses like *Daraz*, and healthcare fields are also utilising AI tools.

Issues	Recommendations
<b>Government's Role and Growth of IT Sector</b>	
Un-tapped potential of IT sector	<ul style="list-style-type: none"> <li>● Government should facilitate overall IT sector and particularly private sector to actualise its potential contribution.</li> </ul>
Barriers in the growth of IT Exports	<ul style="list-style-type: none"> <li>● Government and policy makers should eliminate hindrances to export of IT services, software exports, and freelancing.</li> </ul>
<b>Financial Barriers</b>	
Limit on foreign currency transaction	<ul style="list-style-type: none"> <li>● Financial regulations should be revised to increase the limit of foreign currency transactions.</li> </ul>
Restriction on the foreign currency retention	<ul style="list-style-type: none"> <li>● Freelancers should be allowed to retain foreign currency in local bank accounts.</li> </ul>
<b>Digital Ecosystem</b>	
Lack of digital ecosystem in Pakistan	<ul style="list-style-type: none"> <li>● Investment in STEM and emerging skills to prepare necessary workforce.</li> <li>● Incentive to new startups including tax breaks and early funding.</li> </ul>
Lack of digitalisation in public sector organisations	<ul style="list-style-type: none"> <li>● Government departments should work in liaison with private organisations, to digitise the public service delivery.</li> </ul>
<b>Data Security</b>	
Lack of Data Security	<ul style="list-style-type: none"> <li>● Implement international data security protocols to safeguard against cyber threats.</li> </ul>

# Understanding IoT, AI and its Tools: Opportunities and Challenges that Every Professional Must Learn

**Dr. Kashif Zafar** has a PhD in Computer Science from FAST-NU, Islamabad and MS in Computer Science (IS) from The City University of New York, USA. He has twenty years' experience of research, teaching, data analysis, research analysis, systems programming and management.

He has worked with the Office of Institutional Research Brooklyn College, USA, Department of Education, New York USA, GIK Institute of Engineering, Science & Technology, Pakistan. He is currently serving as Head of Computer Sciences Department at FAST University, Lahore.



Dr. Zafar started off by defining basic terms used in the field such as data warehousing, web mining, big data, cloud computing, machine learning and artificial intelligence, so as to bring all the participants at par. He elaborated how technology helps in decision making and governance, & stressed the need of capacity building and curtailing risks related to data exploitation, privacy and security.

## Data Science and Transformation of Data over the Time

The speaker stated the rule of information that it should always be accurate, relevant, and timely. The information becomes knowledge when an outcome is drawn using that information. Similarly, knowledgebase systems are expert systems developed with knowledge, facts and figures, used for decision making. A *database* is electronic record keeping system developed 30 years ago, with purpose of making paperless environment.

*Technology empowers informed decision-making and enhances governance effectiveness.*

He explained that online data, also known as live data, is continuously updated as transactions occur, such as with point of sale (POS) systems. In contrast, offline data is static and often considered a burden due to its storage

*Due to the increased computing capabilities and evolving technology, computer could access more and more data, this necessitated enhanced data storage and processing capabilities*

requirements. Realising importance of historical data in analysis, decision making, and devising strategy the concept of *Data Warehousing* emerged. As data grew over time, concept of *Data Mining* emerged to cater data storage and processing.

Dr. Zafar discussed the shift from using Ram (Uniprocessors) to parallel or Dual processing technology and now it enhanced the capability to use and store large amounts of data. In preceding years, *Data Cloud* invented, which is basically an infrastructure that facilitates data storage. *Cloud Computing* is a whole paradigm shift seen globally from hardware to infrastructure as a service (IaaS), network as a service (NaaS) and platform as a service (PaaS). In Pakistan, cloud computing contains all the applications, data, and security tools. Technology enables and supports all these programmes and continues to evolve over time.

## Evolution of Big Data

The speaker informed that evolution of big data is fueled by the emergence of internet. The concept of *Web Mining* arrived to process bulk data; still, processing huge amounts of data (in zettabytes) remained an issue. To cater this challenge, another field "*Data Science*" emerged in academia and became need of the hour.

Through Internet of Things (IoT) machines send, receive, and process information as well as perform actions at nodes where sensors are installed. The sensors also produce data, hence a huge volume of data generated which is which is called *Big Data*. Multiple sources within society such as banks, traffic cameras, NADRA, and many other organizations are producing big data. *Data Analytics* deals with retrieving knowledgeable facts and insights out of huge data.

*NADRA and Banks are among the sources generating big data.*

### Machine Learning and AI

*AI and robotics are reshaping industries & displacing traditional jobs* He elaborated that intelligent behavior can be measured by objective and scale. Intelligent machines are defined as per the richness of goal achievement as well as performance mechanism. AI is the automation of intelligent behavior that involves perception, reasoning, learning, communication, and action in complex environment.

The Speaker said that now machines can perceive, learn, and act with the help of sensors. Therefore, robots are performing a variety of tasks such as welding, surgery, manufacturing, embroidery, chip work, and replacing humans in these fields causing job displacement. Accordingly, ML engineering, AI engineering, knowledge engineering, data science, and knowledge representation skills are the new requirements of industry.

### Digital Transformation & Cyber-Physical Systems

Dr. Zafar informed that automation is speedily expanding in Telecom sector and till next decade humans will be replaced by automated systems and machines. AI and IoT is evident in almost all walks of life e.g. speech recognition, mapping, industrial robotics, automated healthcare systems, and hospital management. In banking sector, concept of FinTech has emerged, branchless banking and digital services are the example of digitalization.

He added that global industry is witnessing industry 5.0 which is AI and IoT, however Pakistan's industry is still working at level 2.0 or at the border of 3.0. Our industry needs to be aligned with fourth industrial revolution (Industry 4.0) which is *Cyber Physical Systems*, only then it would be able to absorb the next generation of industry 5.0.

The speaker concluded that vision is to transform home to smart home, city to smart city and economy to smart economy. Smart retailing, smart supply chain, connected cars and traffic management are examples of advanced use of AI in world. Pakistan may also follow these examples as benchmark.

Issues	Recommendations
<b>Government's Role and Growth of IT Sector</b>	
Inefficient infrastructure for data processing and utilisation	<ul style="list-style-type: none"> <li>● Investment in IT infrastructure through collaboration of public and private sector</li> <li>● Courses and trainings to prepare the workforce for emerging skills</li> </ul>
<b>Data Privacy &amp; Security Risks</b>	
Unauthorised access to local data	<ul style="list-style-type: none"> <li>● Implementation of modern data security protocols.</li> <li>● Adopt AI-enabled control systems for better data protection.</li> </ul>
<b>Advance Data Handling Tools</b>	
Unnecessary data traffic and wastage of resources	<ul style="list-style-type: none"> <li>● Advanced Technological measures to identify the accuracy &amp; reliability of data</li> </ul>
<b>Artificial Intelligence and Job Displacement</b>	
Jobs loss as a result of intelligent machines/robots	<ul style="list-style-type: none"> <li>● Academia-industry linkages to redesign curriculum as per market requirements.</li> <li>● Short courses, diplomas, and internships should be offered to fresh graduates.</li> </ul>
<b>Automation of Logistics Sector</b>	
Less adoption of digitalisation/automation in logistics sector of Pakistan	<ul style="list-style-type: none"> <li>● Digitalisation of logistics sector of Pakistan to make it as par with global standards</li> </ul>

## Understanding FinTech and E-Commerce: How Digital Platforms Provide Interface between Government, Trade, and Industry

**Mr. Salman Akhtar** is the Co-CEO of Techlogix. He is also the CEO of AdalFi, a digital lending fintech, which spun out of Techlogix. He has raised more than \$20 Million in equity funding rounds from institutional investors for his ventures. Mr. Akhtar is also the Co-Founder of OPEN (Organization of Pakistani Entrepreneurs) with 15+ chapters around the world. He has BS and MS degrees in Electrical Engineering from Massachusetts Institute of Technology.



Mr. Akhtar, a successful entrepreneur in the FinTech sector and founder of two thriving startups, shared his insights on the emergence, rapid growth, and transformative impact of FinTech in Pakistan and globally. Drawing from his extensive experience, he explained how FinTech has revolutionized traditional payment rail systems and highlighted the significant opportunities for financial service providers to explore areas beyond the conventional banking system.

### FinTech and Transformation of Financial Services

Mr. Akhtar said that IMF/World Bank has defined FinTech as "Advances in technology that have potential to transform the provision of financial services spurring development of new business models, applications, processes and products". He stated that FinTech is emerging at different paces across the world. Governments, banks, and various entities provide financial services to citizens, and FinTech enables these institutions to enhance and optimize their offerings.

The speaker informed that the concept of Fintech emerged in 2013, with China being the first to adopt it. Technology often leapfrogs, allowing some to jump ahead of others. The significance of FinTech lies in its transformation of financial service provision. In Pakistan, over the last six quarters (Q2-2022 to Q3-2023), there has been a 21,000% growth in the use of the Raast platform for transferring payments. Raast facilitates person-to-person fund transfers.

*He informed that during (Q2-2022 to Q3-2023), there has been a 21,000% growth in the use of the Raast platform for transferring payments*

He highlighted that the hyper growth of the Raast channel is enabled by connectivity and the "supercomputer" that each of us carries in the form of mobile phones. Global connectivity has been enhanced, with mobile internet usage reaching 57% of the world population, and even in least developed countries (LDCs), this percentage is 25% (GSMA, 2023). However, he emphasized that computing power is also essential for data processing. Cloud computing offers sufficient infrastructure and computing power to startups, enabling them to compete in the market effectively

*Digital transformation helps rewiring of the organisation to create better value for the customers through applying technology at scale*

Mr. Akhtar underscored that mobility and connectivity is imperative to drive Tsunami of digital transformation across all industries. Digital transformation is Rewiring of the organisation to create more value for the customers by deploying technology at scale. Examples of digital transformation in Pakistan are e-filing (tax at FBR), e-stamp papers and online company registration with SECP. Additionally, buying airline and bus tickets online, food delivery service, use of Google map, telemedicine, e-commerce, and collating election results etc., are other examples of digitalisation.

## FinTech and Real-time Payments

The speaker said that FinTech is digital transformation of financial services where the desired characteristics of payment system such as easy, fast, cheap, and universal acceptability are fulfilled. He added that FinTech has three basic pillars i.e. payment, lending, and asset management. A good lending system is characterized by easily accessible loans, easy reinstalment plans, quick processing, and lending right amount of money to consumers.

He described “Payment Rails” as ways of making payments. Traditional payment channels were usually cheques and cash. Inter Bank Transfer (IBFT) is another widely used channel, however applications like easypaisa, JazzCash, Raast, and QR code function as payment rails for people who do not own bank accounts. FinTech facilitates customers and delinks account with payment. Any country intends to transform financial services starts with payment rails, thereafter lending and asset management are transformed.

## Global View of Digitalisation & AI

Mr. Akhtar informed that in Pakistan consumer loan to GDP ratio is 1.6%, lowest in comparison with Indonesia (10%), Egypt (15%) and much lower than U.S (78%) which can be used as a benchmark. The convenience of informal borrowing is a key reason for the low rate of formal borrowing.

*The convenience of informal borrowing is a key reason for higher number of users*

He added that formal loan lending should also be quick and easy. There is an opportunity for financial service providers to utilize FinTech applications. He shared global statistics of Real Time Payments (RTP), where India surpasses other countries and leads through a centralized system called India Stack. For many years India has been working on digitalising payment rails and issued Adhaar IDs and successfully operationalized FinTech.

*In Real Time Payments (RTPs), India surpasses many other countries and leads through a centralized system called India Stack*

## FinTech and Pakistan: Current Scenario and Future Potential

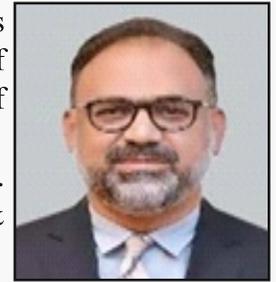
The speaker noted that in Pakistan, two critical elements are already in place: IDs and payment rails. However, trust and consent are still lacking. FinTech has capitalized on these gaps, addressing areas that traditional banks have not. A robust financial system should prioritize stability, integrity, efficiency, privacy, and consumer data protection. Currently, the local economy relies heavily on cash transactions, which can be transitioned to digital formats. Emerging concepts like Blockchain technology and Central Bank Digital Coins (CBDC) are poised to further revolutionize FinTech.

Issues	Recommendations
<b>Computing Power and Connectivity</b>	
Weak Connectivity Issues	<ul style="list-style-type: none"> <li>● Investment in the telecom infrastructure for stable internet connectivity</li> </ul>
Lack of Computing Power	<ul style="list-style-type: none"> <li>● Upgradation of IT infrastructure through research and development and collaboration between public and private sector</li> </ul>
<b>Loan to GDP Ratio</b>	
Low Loan to GDP Ratio of Pakistan	<ul style="list-style-type: none"> <li>● Formal borrowing procedures should be made easy, quick, digital and with less paper requirements</li> <li>● Elimination of unnecessary barriers for bank loans through upgrading regulations to counter default risks and uncertainty</li> </ul>
<b>FinTech</b>	
Lack of FinTech Utilisation by Financial Bodies	<ul style="list-style-type: none"> <li>● Formation of centralised data stack for payment rails and fintech.</li> <li>● Promotion of Fintech Startups including government investment and upgradation of financial rules and regulations</li> </ul>

# Digi-Finance and Banking: State Bank's Initiatives and Potential Impact on the Economy

**Mr. Qazi Shoaib Ahmad** is a career Central Banker with over 25 years of illustrious Central banking experience. He has held several key positions at SBP, such as Director of the Development Finance Support Department, Regional Head Operations, and Chief Manager at SBP BSC Offices (the operational arm of SBP).

Mr. Ahmad holds a Master's degree in Mathematics and Diploma in Banking & Finance. Currently, Mr. Ahmad is serving as the Director in the Payment Systems Policy & Oversight Department.



Mr. Ahmad started off by stressing the importance of digital transformation of financial services for economic growth and the enabling role of the State Bank of Pakistan (SBP). He discussed the relevant regulatory laws and policies issued by SBP to govern and facilitate the digital financial system (DFS). Additionally, he shared that SBP is now focusing on amending and supplementing existing acts concerning FinTech and initiating licensing.

## FinTech – Basic Concept and Enabling Role of SBP

The Speaker explained the concept of FinTech and the enabling role of SBP in digital payment systems. He highlighted FinTech's core functions in payment transfers, lending, and wealth management, emphasizing that scalability and prosperity are facilitated by key enablers such as public

*He said that public infrastructure, telecom services, and data sharing regulations are fintech enablers*

infrastructure (digital IDs), widespread telecom service acceptance, and data sharing regulations. As the regulatory authority, SBP aims to foster industry growth while ensuring compliance and consumer protection

## SBP Initiatives Regarding FinTech

*The 2019 National Payment strategy prioritised government payments, the retail market, and remittances.*

He outlined that in 2019, the State Bank introduced the National Payment Strategy, organised into six key areas: legal framework, payment infrastructure (including Raast, RTGS/PRISM), oversight, government payments, retail market, and remittances. Emphasizing digitalisation, the strategy prioritised government payments, the retail market, and remittances. He elaborated on modern applications introduced as payment rail systems with interoperability features, enabling the use of financial instruments (such as cheques, cards, mobile wallets, and internet banking) across various delivery channels like mobile banking, POS machines, ATMs, internet banking, and e-commerce platforms.

## Rise of Cashless Banking

Mr. Ahmad stated that branchless banking was started in 2013, as a bench mark of digitalisation. Henceforth, concept of *Agents* emerged, and more than 500,000 agents have been working across the country. Agents provide the facility of cash-in and cash-out to consumers, the service is efficient however, it increases currency – in – circulation. Shopkeepers who are offering *easypaisa* and *Jazz cash* services are example of *Agents* working at every street corner. As a result, applications of *JazzCash* and *easypaisa* held 90% of payment transfer transactions last year.

Another widely used payment transferring channel is through *mobile wallet*. At present, 73% payments are currently held through mobile wallets in Pakistan. He added that use of debit or credit cards for payments is also common,

*In Pakistan, 73% payments are currently made through mobile wallets*

nevertheless cards are widely used in Western countries, whereas Asian countries' people majorly use mobile wallets and other applications enabled by smart phone devices. Raast is another widely used digital app facilitating person to person and person to merchant payment transfers.

## Use of Digital Financial Services (DFS) in Pakistan

The speaker said that DFS-Stack approach is currently deployed to our country and constituted of certain components.

The first component is digital ID and mobility. NADRA verification system and Wi-Fi service enables this component. Second is payment rails i.e. Raast, IBFT, PRISM etc. Third is law and regulatory system. SBP has provided overarching law that allows non-bank entities to provide payment services. FinTech entities such as *Sadapay*, *Nayapay* come under the umbrella of SECP and work as electronic money issuers (EMIs). Fourth component is digital innovation system, e.g. use of blockchain technology. The fifth component is oversight which is performed by SBP.

*At the moment, 61% people have digital accounts for payment transfers as compared with 16% in 2015*

He added that financial digitalisation has been revolutionised in Pakistan as currently 61% people have digital accounts for payment transfer compared with 16% in 2015. In next 3 to 5 years, it is expected that the ratio will be 90% indicating a financial revolution.

## Gender Divide in Financial Inclusion

Mr. Ahmad informed that at present 137 million adult population exists out of which 83 million people have accounts. As per gender categorization, 54 million male and 29 million female are depositors to these accounts. Hence, 43% of female adult population and 77% of male has formal bank account. A strong divide of 34% exists in access to financial services, among male and female population.

*There is a gender wise disparity in the access to unique accounts, with 54 million male and 29 million female depositors.*

The speaker highlighted that Artificial Intelligence offers significant applications in the financial system, e.g. fraud detection, credit risk assessment, customer service automation etc. These advancements underscore AI's transformative potential across various sectors of finance and industry.

He concluded by mentioning the future of Digital Financial Systems (DFS) as "Open Banking," where a single application integrates and analyses financial information from multiple bank accounts, providing insights and suggesting actions based on the aggregated data.

Issues	Recommendations
<b>Check on Cash Based Transactions</b>	
Lack of Checks on Private <i>Agents</i>	<ul style="list-style-type: none"> <li>● Develop and implement a mechanism to track and regulate the inflow and outflow of cash for private agents, ensuring greater transparency and accountability.</li> </ul>
<b>Borrowing and Financial Inclusion</b>	
Minimal Formal Borrowing	<ul style="list-style-type: none"> <li>● Financial service procedures should be revised and digitalised for ease of clients to promote formal borrowing from banks</li> </ul>
Gender Gap in Financial Inclusion	<ul style="list-style-type: none"> <li>● Policies should be devised to enhance female inclusion in the financial system through bank accounts</li> </ul>
<b>DFS-Stack Approach</b>	
Gaps in usage of Digital Financial System (DFS)	<ul style="list-style-type: none"> <li>● Public and private institutes should promote usage of DFS tools and applications for their wide acceptance leading to digital ecosystem development within economy</li> </ul>
Inefficient Utilisation of AI tools in DFS	<ul style="list-style-type: none"> <li>● Advanced tools of Artificial intelligence should be utilised in DFS for improving data safety and efficient processing of financial systems</li> </ul>

## Digitalisation and Economy: Pakistan in Regional Context

**Mr. Imran Jattala** is a Startup & Innovation Ecosystem Builder. He has led large-scale Innovation programmes in Pakistan & MENA regions. He is leading National Incubation Center for Aerospace Technologies (NICAT): An integral part of National Aerospace Science and Technology Park (NASTP). Mr. Jattala has led innovation programmes for 25,000+ Entrepreneurs across Pakistan, mentored 600+ Startup Teams, and help raise \$5M+ Investment.



Mr. Jattala stressed the need for and importance of a startup ecosystem in Pakistan as key to tremendous growth. He mentioned that the Government has established NASTP (National Aerospace Science & Technology Park) in order to provide a platform for undertaking new technologies, to practice innovations and to carry out R& D in the domain.

### Importance of Startups for Economy

The speaker emphasised that small businesses are the engine of economic growth and a crucial source of GDP. In China, an average of 50,000 startups are launched each month, supported by 12,000 operational incubation centers. This robust startup ecosystem contributed to China's announcement of eradicating extreme poverty in 2020.

*Small businesses are the driving force behind economic growth*

He said that Pakistan has the potential for a higher growth rate, but macroeconomic challenges over the past four decades have hindered its GDP growth. This underscores the crucial need for a robust startup ecosystem to drive economic progress.

### Silicon Valley and Startup Ecosystem

Mr. Jattala highlighted that Silicon Valley's remarkable growth began with just one successful business in 1959, which then expanded through a "startup multiplier effect." Pakistan is on the cusp of a similar movement, where

*In Pakistan, creation of unicorn businesses could trigger a snowball effect of new ventures*

the creation of unicorn businesses could trigger a snowball effect of new ventures. He said that 'Startup Genome,' a US-based economic consultancy firm that monitors global startup data, predicts the emergence of over 30 ecosystems in the near future.

### Pakistan's Under Performance in Business

The Speaker apprised that development of National Aerospace Science & Technology Park (NASTP) would facilitate development of ecosystem culture. Pakistan is one of the labour-intensive countries however, the country has not

*Doing business in Pakistan is difficult due to certain historical and policy reasons*

secured high scores on various indexes e.g. Global Competitive Index (115<sup>th</sup>), Global Entrepreneurship Index (109<sup>th</sup>), Global Innovation Index (88<sup>th</sup>), and Human Development Index (152<sup>nd</sup>). This is the reason why our country lags behind as doing business is difficult due to certain historical and policy reasons. Woman participation in work force is very low in Pakistan while in Bangladesh the participation rate is quite high.

### Developing an Innovative Culture

Furthermore, the speaker informed that local market has immense potential for multiple *Unicorn Startups*. National Incubation Centre for Aerospace Technologies (NICAT) is an entity with mission to bring growth in national aerospace technology so that Pakistan could claim its contribution in trillion dollar aerospace global market. However, Government, academia and industry should contribute to bring innovative scientific

*Government, academia and industry are all key elements for building an "Innovative Economy"*

technologies to the country and develop domain knowledge based on experimental research. He added that according to *Triple Helix Model*, key elements of building an *Innovation Economy* are industry, academia, and Government

## Entrepreneur Driven Innovation Economy

Mr. Jattala emphasized the need for an innovative culture in Pakistan. He highlighted the Entrepreneur Driven Innovation Economy (EDIE) framework, which addresses individual factors like attitude and skills, as well as ecosystem factors like regulatory and market frameworks. This framework, introduced by Dr. Mark Esposito and Dr. Olaf Groth, could be adopted in Pakistan to foster economic growth through innovation.

The speaker noted that following sectors of Pakistan has potential for growth:

- i. IT & Telecom
- ii. Textile & Apparels
- iii. Pharmaceutical & Healthcare
- iv. Agribusiness & Food Processing
- v. Tourism & Hospitality

## Pakistan's Under Performance in Business

He informed that Pakistan is at early stage in terms of startup ecosystem with small number of an incubator and startup. There are 85 incubators working locally, 20 of them are supported by Government, 30 are privately owned; 35 out of them are operational within universities. To promote startup ecosystem, Ministry of IT has a dedicated cell NIC which funds incubation centres in Pakistan and till date 8 NICs have been funded by this cell including NICAT. As *Return on Investment (ROI)* is concerned, estimated investment in last decade by five organisations i.e. Ignite NTF / MoIT, Planning Ministry, HEC, PITB and KPITB amounts PKR 20B or approx. US\$ 50M. Pakistani Startups raised over a US\$ 1 Billion in last 5 years. Therefore, the estimated (Return on Investment) RoI of Pakistan's startup ecosystem is at least 20 times of original value.

*In Pakistan, estimated Return on Investment of Startup Ecosystem is 20 times of original value*

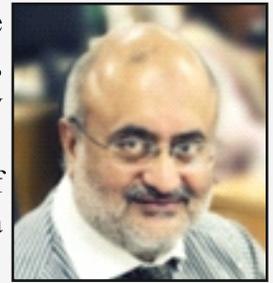
## Importance of Science & Technology Parks (STPs)

In the conclusion, he said that STPs can contribute billions of dollars through exports. Five STPs have been developed in last two years in Pakistan. Businesses seek such places that provide them with ease of doing business, supportive infrastructure, enabling environment and other benefits.

Issues	Recommendations
<b>Developing Special Technology Parks</b>	
Lack of Platforms for Startups	<ul style="list-style-type: none"> <li>● Special Technology Parks (STPs) should be established on priority as a platform to foster technological startup ecosystem in economy</li> </ul>
<b>Offering Incentives to Technological Startups</b>	
Lack of Incentives to Tech-Startups	<ul style="list-style-type: none"> <li>● The Government should offer incentives like tax exemption, low markup on loans, and supply of utilities particularly to technological startups that may help to develop startups culture</li> </ul>
<b>Enabling Startup Ecosystem</b>	
Missing Prerequisites of Startup Ecosystem	<ul style="list-style-type: none"> <li>● To develop startup ecosystem Government should ensure necessary infrastructure, financial services, policy support and encouragement for businesses at national level</li> </ul>
<b>Ease of Doing Business</b>	
Doing Business is Difficult	<ul style="list-style-type: none"> <li>● Policy and administrative reforms to remove the barriers in ease of doing business.</li> </ul>

## Digitalisation and Economy: Pakistan in Regional Context

**Mr. Muhammad Saleem Ahmad Ranjha** has held significant roles in both the government and social sectors. He has served as Secretary BISP, Acting Secretary BOI, Additional Secretary Education, Member FBR, CEO FBR Foundation, Joint Secretary Prime Minister's Office, and Managing Director of the Pakistan Software Export Board. He is also a founding Director of Akhuwat, Chairman of OPEN Lahore, Vice Chairman of the Technology Board of Al-Khidmat, CEO of Public Aid Trust, Advisor to Fatima Group, and a Member of the National Incubation Center (NIC).



Mr. Ranjha, a social entrepreneur involved in various non-profit organizations, emphasised the vital role of entrepreneurship in economic development. By citing examples of successful Pakistani entrepreneurs, he highlighted the role that innovative entrepreneurial ideas can play in this industry and thus contribute significantly to the country's growth.

### Business Growth in a Challenging Environment

The speaker said that business growth requires an enabling environment, but survival and growth in a challenging environment are tests of resilience. He noted that successful corporations globally also navigate such challenging dynamics. Connectivity, infrastructure, and institutional support are fundamental for businesses, but even without these, young entrepreneurs can achieve significant success, potentially becoming unicorns. He cited Interloop, a top-tier textile manufacturer in Pakistan, with an IPO of USD 40 million, and Careem, with a market capitalization of USD 3.2 billion. He added that businesses based on innovative ideas are now generating more profits than traditional ones.

*He informed that businesses based on innovative ideas are now generating more profits than traditional ones*

### Need for and Importance of Entrepreneurship in Pakistan

*He stressed that people should focus on entrepreneurial opportunities rather than maintaining a job-oriented mindset*

The speaker stressed that people should focus on entrepreneurial opportunities rather than maintaining a job-oriented mindset. He suggested building an ecosystem of technological startups as a viable path. Citing a study by Harvard and the New England Medical Journal, he noted that ages 60 to 70 are the most productive years of a person's life. People in this age group can successfully run startups and make significant contributions to the economy

Mr. Ranjha highlighted that Pakistan is the fourth-largest freelancing country with 500,000 freelancers. In 2022, 60 million freelancers in the USA generated \$1.35 trillion, 4.2 million freelancers in the UK contributed \$163 billion, and 25 million freelancers in Brazil added \$50 billion to the economy. In contrast, while India has a large number of qualified freelancers, their focus on the service sector has not led to contributions as substantial as those seen in other countries.

He further gave examples of many Pakistani tech enterprises e.g. Netsol, Abacus Consulting, I2C Inc., Nextbridge, and Afinity etc. that set a benchmark for businesses to grow in an environment full of obstacles and resistance.

*Pakistan is the fourth-largest freelancing country with 500,000 freelancers*

### Digitalisation and Entrepreneurship in Pakistan

According to Mr. Ranjha, the country is already on its way to digital transformation. "Open Global" is an organisation of Pakistani entrepreneurs in North America, founded in 1998 in Boston. The net worth of IT sector of OPEN is \$30 billion.

*He said that the new wealthy are tech entrepreneurs.*

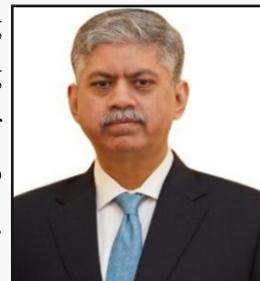
In the 1940s, wealth was concentrated among landowners, while the 1960s saw industrialists at the top. During the 1980s and 1990s, the richest people were those in real estate. Since 2020, however, the wealthiest individuals are

now tech entrepreneurs, with top global companies being high-tech firms.

Issues	Recommendations
<b>Promoting Entrepreneurship</b>	
Lack of Inclination Towards Entrepreneurship	<ul style="list-style-type: none"> <li>● Through awareness programs, success stories, and expert talks, youth should be motivated to run an independent business/tech-unit</li> </ul>
<b>E-commerce and Technology Enabled Marketing</b>	
Lack of Incentives to Tech-Startups	<ul style="list-style-type: none"> <li>● Use of social commerce to market products on multiple social media platforms</li> <li>● Adoption of digital marketing tools</li> </ul>
<b>Developing Innovative Culture Economy</b>	
Lack of Innovation Culture	<ul style="list-style-type: none"> <li>● Ensuing research and development to make product for competitive markets</li> <li>● Innovative and technical businesses should be promoted within the economy instead of traditional jobs</li> </ul>

## Digital Citizenship for Effective Service Delivery: Perspective from NADRA

**Mr. Ehtasham Shahid** was at the time of the Policy Dialogue, the Chief Operating Officer at NADRA. He has earlier served in NADRA in different capacities including Director General Operations (Sukkur Region), Director General (Compliance), Director General (Projects), Director General (Human Resources) & Principal Staff Officer to Chairman NADRA. He has an MBA degree from Institute of Management Sciences, Lahore.



### Business Growth in a Challenging Environment

Mr. Shahid started off by discussing NADRA's history, tracing its origins to the enactment of the Registration Act in 1973, which marked the beginning of paper-based ID cards.

After the census of 1997, the need of digitized data became apparent. As a result, in 1998, National Data Organization was established to digitise all the 1997 census forms.

*After the census of 1997, the need of digitised data became apparent*

In 2000, National Database & Registration Authority (NADRA) was formed as an authority with its own financial and legislative autonomy. It is a citizens' database with different technology solutions and registration infrastructure. With over 800 registration centres and 23000 employees, spreading over 8 different administrative regions,

### NADRA's Services and Data Base

The speaker informed that the only EU Schengen & India's *adhaar* card-based databases are bigger than NADRA but as far as the data centralization, referral, verification and integrated approach are concerned, NADRA is much better than both of these data bases.

Contrary to common perception, NADRA's services extend beyond ID cards issuance. About 50% of its activities are project based and project revenue line is actually the main source of revenue.

Overall, NADRA interacts with 270, 000 to 280,000 people and delivers 120,000 documents on daily basis. As far as statistics are concerned, NADRA is probably one of the largest if not the largest Citizen identity processing institution across the world.

He briefed that 211 million identities have been issued. 1.5 billion fingerprints and 150 million facial images have been successfully entered in the data base. The facial matching search engine can run 40 million matches per second.

Citizen registration documents or CRVS (Citizen Registration Vital Statistics) issued by Union Council such as CRCs (Child Registrations Certificates) act as primary feeder documents. Across Pakistan, 11,750 union councils have been linked with NADRA for cross verification for the other services

*NADRA performs 1.5 million transactions every day for 800 clients*

Mr. Shahid apprised that NADRA has a contractual arrangement with its clients e.g., Tax Dept., Banks, Telecom Companies, Land Record Authority & social protection programs. The organization performs 1.5 million transactions every day for 800 clients.

Discussing ongoing initiatives, the speaker highlighted NADRA's close collaboration with the FBR to develop a mechanism for identifying potential taxpayers. Additionally, NADRA has successfully implemented an online visa process in partnership with the Ministry of Foreign Affairs. The legal inheritance initiative streamlines the process for ordinary Pakistani citizens, reducing their need to visit courts unnecessarily, as all requirements are now generalized within our system, resulting in succession certificates being issued within 20 days. Furthermore, during the COVID-19 pandemic, NADRA played a pivotal role in issuing vaccination certificates. The online application option through website and Pak ID app for various services is available.

### Data Security Initiatives

The speaker said that in case of any suspicion, NADRA doesn't deny the application but it takes time to do the back-end security checks. With every application either approved or not, the fingerprint data enters the system.

In coordination with the SAFRON Ministry and UNHCR, a significant project was launched through which all Afghan refugees were asked to get themselves registered. In October 2023, they were given a certain timeline to repatriate to Afghanistan. During this time, some of the refugees try to register themselves as the Pakistanis but their finger print data as Afghan refugees promptly flagged and halted the processing. No data is useful until unless we bring in certain linkages with other databases.

*NADRA is collaborating with FBR for identifying potential taxpayers*

### Embracing Technological Advancements

Mr. Shahid stated that technological divide and data privacy are big challenges because every bit of data is prone to hacking but security checks, firewalls and encryptions are in place.

He further added that we have to continue evolving ourselves in technology. The race is to survive and the survival is to actually evolve and that evolution has to be continuous.

*Technological divide and data privacy are big challenges for NADRA* ADRA has always been active in disaster relief operations especially for the identification of dead bodies and new cards issuance in the flood areas. NADRA has a system for emergency deployment through which fingerprints are put in the data base and if the system shows the record, new ID cards are immediately issued.

The speaker also highlighted that the artificial intelligence is the way these days No data is useful until unless we bring in certain linkages with other databases. The back-end data analysis helps in the decision making & information is only disseminated when it is cleared by the top management.

### Legal Hurdles

The speaker added that there's no requirement for physical verification of the child at the union council, meaning that anyone with a Child Registration Certificate (CRC) application can obtain identity documents. This poses a significant challenge, as it opens the door for identity fraud and the potential infiltration of non-citizens into our database.

NADRA is actively addressing this issue by implementing measures to flag unusual CRC applications and integrating feeder data across all levels.

He informed that some proposals have been made for policy changes to include a photograph as a mandatory component of birth registration, enhancing the security and authenticity of identity documents.

### Charting the Future: Towards Digital Identity Solutions

Talking about the future, the speaker informed that NADRA is planning to introduce digital ID to move away from the paper based or the polycarbonate-based Product. It will be a long-term project where our identity will be transformed into a digital form.

He added that the biometric attestation is also an issue because every citizen identity document application requires an attestation. A lot of people try to manipulate the system through the manual attestation and NADRA doesn't

*NADRA is planning its own AI solution for analysis and cross data base verifications*

have a system to cross verify that whether a certain grade 17 officer has tested the form or not. In future, an amendment is in consideration after which the attestation will only be biometric through a mobile solution.

The speaker informed that currently, there are only two types of recognition technologies: fingerprints and facial but NADRA is also planning to introduce the IRIS recognition technology. Although the fingerprints are considered to be one of the most secured, but eye scanning is even more secure. This additional feature will also be helpful in case where fingerprints capturing is difficult.

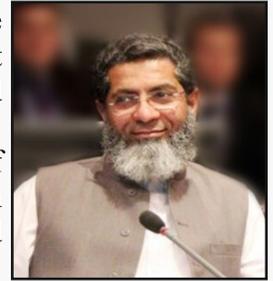
Talking about the AI, Mr. Shahid said that the organization is going to have its own AI solution in place where every submitted document will be analyzed through AI and cross data base verifications will be done. This will make the data more secure.

Issues	Recommendations
<b>Data Security Threat</b>	
Continuous Threat of Data Hacking	<ul style="list-style-type: none"> <li>● Upgradation of data security measures, including security checks, encryption, and firewalls, to safeguard system against cyber attacks</li> </ul>
Lack of Use of AI in Analysis and Verifications	<ul style="list-style-type: none"> <li>● Develop indigenous AI solution for document analysis and cross-database verifications to improve data security and accuracy</li> </ul>
<b>Identity Fraud and Database Infiltration</b>	
False Citizenship Claims	<ul style="list-style-type: none"> <li>● Digitalisation of all immigrant related data and its linkage with central data base to identify any attempt for fake entry</li> </ul>
No Child Verification During CRC Issuance	<ul style="list-style-type: none"> <li>● Policy changes to add physical verification and photograph in CRC issued by union council</li> </ul>
Quality of Identification Mechanism is not up to the International Standards	<ul style="list-style-type: none"> <li>● Inclusion of IRIS recognition technology alongside fingerprints and facial recognition for enhanced security.</li> </ul>
<b>Fake Attestation of Identity Documents</b>	
Fake Documents Attestation by Unauthorized Persons	<ul style="list-style-type: none"> <li>● Use of biometric verification of attestation officer through mobile solutions.</li> </ul>
<b>Data Sharing Among Different Institution</b>	
Lack of Data Sharing Among Institution	<ul style="list-style-type: none"> <li>● Implementation of a Data Sharing Law to integrate major data bases to maximize the utility of available data for decision-making and public service</li> </ul>

## Digital Transformation in Punjab: A Case Study

**Mr. Waqar Naeem Qureshi** currently serves as Director General, IT Solutions, at the Punjab IT Board (PITB). At PITB, he has successfully spearheaded several important information technology initiatives for the Education, Health, Transport, Livestock, and Agriculture sectors.

Prior to joining PITB, he has held important roles at the Lahore University of Management Sciences (LUMS), Pakistan, United Technologies Carrier, UAE, Vroom Technologies, USA, and IBM Pakistan. He has a double-major in Computer Science and Economics, from Beloit College, U.S.A.



Mr. Qureshi initiated his discussion by underscoring the digital transformation in Punjab and the various initiatives in collaboration with other government agencies.

### Digital Transformation in Punjab

*Transformation journey is actually the reformation of organisations aimed at creating value by the continuous deployment of technology at scale*

Transformation journey is actually the reformation of organizations aimed at creating value by the continuous deployment of technology at scale. In IT projects, it's very difficult to get things right and on time but it's doable with right focus on strategy, technology, governance, and adoption.

The speaker pointed out the critical role of the Planning and Development (P&D) in assessing the value generated by digital initiatives. PITB is the technology arm of Punjab Government operating for the past 25 years, the objective is to reform service delivery through a range of IT services and initiatives. PITB's Data Centre hosts the data bases of 40 different departments.

He highlighted the E-Stamping Initiative introduced in 2017 which has significantly increased the revenue transparency and return on investment on the project was just 4 days. The concept of traceable bar-coded stamp papers has also been adopted by other provinces. The E-filing system has been implemented across various government departments and chief minister's office reviews the files only if they are submitted through e-filing system.

Touching upon citizen facilitation services, Mr. Qureshi informed about the citizen-centric approach adopted by facilitation centers, offering a wide range of services under one roof. The idea was to eliminate the

*In IT projects, it is very difficult to get things right and on time*

concept of visiting different department for documents or services and 150 different government services are now available at the facilitation centres. The data once entered at the facilitation centre is shared among all the departments involved to minimize the hassle. Same model has been adopted in the Business Registration Portal where 7 to 8 different department have been interlinked to approve a business request.

The speaker particularly mentioned the digital transformation of Punjab Education Department, focusing on the implementation of a self-reporting system in the schools. The initiative has significantly reduced cost while improving data accuracy and accessibility. The education data is available to monitoring and evaluation officers and central department to formulate their strategies.

### Data Governance

He emphasised an urgent need for comprehensive data integration and governance measures. The success of these digital initiatives depends not only on the availability of data but also on its accuracy, completeness & consistency. This is imperative for optimizing resource utilisation, transparency and evidence-based decision-making.

*Some departments gather similar data sets independently, leading to redundancy and inefficiency*

The absence of standardized protocols sometimes results into data inaccuracy and crucial information for informed decision-making. By leveraging advanced technologies e.g., real-time dashboards, government

entities can access real time data and enable data-driven decision-making processes.

Stressing on the need of data sharing, the speaker said that in Government projects there is a lack of data sharing. Currently, some department departments gather similar data sets independently, leading to redundancy and inefficiency. A more streamlined approach, could significantly enhance data accessibility and reduce duplication efforts.

He proposed that the government must establish a legal framework for data sharing and appoint chief data of fcers. Currently, there is no formal law to govern the data sharing within government. Therefore, implementing *There is no formal law to govern the data sharing within government* legislation to facilitate secure and standardized data sharing would promote efficiency and transparency.

### Challenges in the Digital Transformation

The speaker mentioned challenges in the government projects that demand strategic attention and innovative solutions.

One such challenge is the relentless pressure to deliver results within tight timelines, often compromising the opportunity for thorough needs assessments and strategic planning. Additionally, limited access to comprehensive data poses a significant hurdle in the expected outcomes.

*Transformation is not just about technology alone, it's about the people, processes and technology.* Another critical challenge is the fiscal constraints and competing priorities within provincial budgets. Balancing investments across sectors such as infrastructure, healthcare, education, and IT remains a challenge, requiring careful consideration of long-term impact. The recruitment & retention of skilled resources in the financial uncertainty affect the projects.

He said that Transformation is not just about technology alone, it's the people, processes and technology. Therefore, Executive level sponsorship and continuous drive is essential while right people should be in the committees otherwise the initiative will lose its spirit.

### Data Quality and Skills

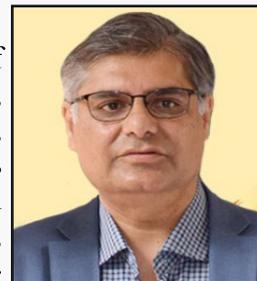
Mr. Qureshi emphasised continuous focus on data quality. Most organisations capture the data and have basic structure in place but the assessment of data quality is an issue has to be addressed. Globally *Transformation is not just about technology alone, it's about the people, processes and technology.* companies are spending billions to upgrade the skills of workforce and gearing them up to deal with generative AI.

The speaker proposed that we should start initiatives to upgrade the skills of our workforce and a lot has to be done to reduce the skills gap in industry for which the quality of education is also to be improved.

Issues	Recommendations
<b>Composition of the Committees'</b>	
Non-Technical Committee Members	<ul style="list-style-type: none"> <li>● Appointment of technical members in the Committees</li> </ul>
Management Change During the Projects	<ul style="list-style-type: none"> <li>● Completion of tenure in the Leadership during the project completion period.</li> </ul>
<b>Legal Framework</b>	
Lack of Data Governance Act	<ul style="list-style-type: none"> <li>● Introduction of Data Governance Law to regulate the inter-departmental and inter-provincial data sharing with efficiency and transparency.</li> </ul>
<b>Duplication of Data</b>	
Wastage of time and Resources in similar Data Collection	<ul style="list-style-type: none"> <li>● Departmental coordination and data sharing through specific protocols to control the unnecessary waste of time and funds</li> </ul>
<b>Accuracy of the Data</b>	
Lack of Standard Data Acquiring Mechanism	<ul style="list-style-type: none"> <li>● Establishment of Data Management Offices and appointment of Chief Data Officers to ensure the quality of data.</li> </ul>
<b>Technical Skills of Public Sector Workforce</b>	
Fiscal Constraints to Retain the Skilled Workforce	<ul style="list-style-type: none"> <li>● Allocation of sufficient funds for IT projects to ensure to market-based salaries</li> </ul>
<b>Lack of Skills in IT Industry</b>	
Lack of Skills in IT Workforce	<ul style="list-style-type: none"> <li>● Free courses/trainings for public and private sector on AI and emerging technologies. Reforms in education sector to align curriculum with industry needs.</li> </ul>

## Artificial Intelligence and its Impact on Education: A Sectoral Analysis of Teaching Tools and Methods

**Prof. Dr. Arshad Saleem Bhatti**, Rector at Virtual University of Pakistan, holds M. Phil. and Ph. D. degrees in Microelectronics and Optoelectronics from the University of Cambridge, UK. He has completed postdoctoral work at the University of Roma in Italy, the University of Nottingham, UK, and the University of Illinois at Urbana-Champaign, USA. With extensive experience in e-Education, he has developed online video lectures and web-based courses for the MIT BLOSSOMS project, ISESCO, and virtual laboratories. His research interests include materials science, nanostructures, optoelectronics, and low-temperature physics. Dr. Bhatti has been awarded the Tamgha-i-Imtiaz in 2012 and the Sitara-i-Imtiaz in 2020.



Dr. Bhatti based on his extensive experience in the field, discussed the need and challenges with regards to digitalisation and potential of AI tools such as Machine Learning in the education sector.

### Skills Based Job Market

Mr. Bhatti said that advancements in artificial intelligence and big data have brought a paradigm shift in the education sector and therefore universities should embrace online learning. In this regard, he highlighted the Higher Education Commission's policy that advises conventional universities to offer at least 30% of their content online. The online transition can help the educational institutes to overcome capacity limitations and help in greater student outreach by minimising fiscal hurdles and accessibility issues.

*He highlighted the lucrative opportunities available through mastering DigiSkills.*

While highlighting the significant impact of online education on economic empowerment, he said that freelancers, trained through Digi Skills platform at Virtual University have collectively earned over \$400 million.

The speaker stressed that in the current industrial era, the demand in the private sector is shifting towards individuals equipped with practical skills rather than theoretical knowledge only. Consequently, there's a pressing need to translate theoretical knowledge into actionable skills.

### The Urgent Call to Learn New Skills

*He stressed the need to acquire skillsets based on market needs which is fast moving towards digitalisation*

He highlighted the urgency to acquire new skills as the traditional degrees are losing significance, giving way to a focus on practical skills acquisition. In the international context, he gave the example of Google, where 50 % of the workforce lack formal degrees but possess the necessary skill sets for their roles.

### Challenge for Policy Makers

The speaker highlighted the challenges in an era characterized by rapid technological advancements, learners, trainers, and policymakers. and these learning challenges have become imperative for effective skill development and policymaking.

The time taken by policymakers to formulate and implement policies often lags behind the rapid evolution of technology. This underscores the critical need for policymakers to stay informed about technological changes and integrate them into policy-making processes effectively. He mentioned he efforts by Pakistan in cyber security while the impact of social media continues to evolve rapidly, highlighting the slow pace of law enforcement agencies as compared to the people who are violating the rules.

*Technological advances outrun the policy formulation to tackle challenges.*

## Knowledge Tsunami and the Race to Adaptation

Dr. Bhatti also spoke about the “knowledge tsunami” as a result of technological advancement and new knowledge creation.

Over the past fifty years, the landscape of technology and education has evolved at an enormous speed. With longer human life expectancies and decreasing technology time spans, individual may need to adapt three or four technologies in their life spans. The competition to remain valid in the market through skills enhancement is growing. Artificial Intelligence would revolutionize the approach to education by enabling personalized learning and more robust curriculum development for the need of market.

*With longer lives and rapid tech shifts, individuals may need to master three or four technologies in their lifetimes*

He added that generative AI utilizes existing knowledge to create new insights and information. However, the pace at which knowledge is being generated is staggering, with the shelf-life of information diminishing to mere hours.

## Internet of Things (IoT) and Fifth Industrial Revolution

The Speaker drew attention to the massive amount of data that is being produced by (Internet of Things) IoT and the necessity to harness this data for meaningful insights crucial for the fifth industrial revolution.

The speaker underscored the interaction of science and technology and the synergy between machines and humans which is marking the fifth industrial revolution. The human brain's complexity is unparalleled, however, the ability of new technologies to process unstructured data into meaningful information is a serious challenge.

He emphasised on the interdisciplinary collaboration and innovation for incorporating the biological elements in machine design such as DNA computing.

*The ability of new technologies to process unstructured data into meaningful information is a serious challenge.*

## AI, Innovation & the Challenges

Dr. Bhatti emphasised that the challenges of fifth industrial revolution require innovative teaching and adoption of evolving digital landscape.

The traditional classroom learning has a limited approach as compared to AI driven digital learning tools. The online resources through the application of AI offers abundance of problems and exercises in different formats.

These systems can analyse students' data and behavior to tailor learning experiences according to individual needs, preferences, and learning styles. Visual simulations powered by AI can enhance understanding and can also help the educators to design a more robust classroom experience and empower student to become self-directed learners. These initiatives will inspire creativity, collaboration and intellectual growth.

The speaker drew attention towards the ethical, legal, and technical challenges associated with the widespread adoption of AI in education. Concerns related to data privacy, quality assurance, infrastructure requirements, and

*The ability of new technologies to process unstructured data into meaningful information is a serious challenge.*

societal acceptance need to be addressed to ensure the responsible and effective integration of AI technologies in education.

In conclusion, he said that despite the challenges, embracing AI in education presents an opportunity to revolutionize learning and teaching practices, ultimately empowering individuals and advancing societies

Issues	Recommendations
<b>Online Learning and Skills Development</b>	
Lack of Online Learning Platforms	<ul style="list-style-type: none"> <li>● Universities should develop more online learning platforms to reach larger audience and to minimise the infrastructural cost</li> </ul>
Slow Adoption of Emerging Skills related Courses in Academia	<ul style="list-style-type: none"> <li>● Incorporation of emerging skills courses e.g. AI &amp; ML in the academia through academia-industry linkages</li> </ul>
<b>Policy Making and Technological Change</b>	
Slow Response at Policy Formulation Level	<ul style="list-style-type: none"> <li>● Informed and urgent policy making process to bridge the gap between the rapid evolution of technology and societal change</li> </ul>
<b>AI in Education</b>	
Lack of Full Utilisation of Advance Digital Tools	<ul style="list-style-type: none"> <li>● Establishment of AI driven digital classrooms for visual simulations and problem-solving exercises</li> </ul>
Responsible Integration of AI in Education	<ul style="list-style-type: none"> <li>● Development of robust quality assurance mechanism to maintain the integrity and educational value of AI-generated materials</li> </ul>

# Artificial Intelligence and its Impact on Education: A Sectoral Analysis of Teaching Tools and Methods

**Prof. Dr. Sarfraz Khurshid** is a Professor of Electrical and Computer Engineering at the University of Texas at Austin. He completed his PhD in Computer Science from MIT. He received a BSc in Mathematics and Computer Sciences from the Imperial College (London), and read Part III of the Mathematical Tripos at Trinity College, Cambridge. He is the recipient of the ACM SIGSOFT Impact Paper Award (2012), two ACM SIGSOFT Distinguished Paper Awards (ISSTA 2002 and ICSE 2010), a Best Practical Paper Award (IEEE S&P Oakland 2014), a Best Research Paper Award (ASWEC 2009), and an NSF CAREER Award (2009).



Dr. Khurshid being an expert on the field, started off his discussion by providing an overview of AI, its development over time, and its capacity to outperform conventional computing methods. Based upon his experience in USA and Pakistan, he informed the audience about the need of reforms in education and investments in AI, and suggested solutions to overcome the problems.

## The Evolution and Impact of AI

AI- the automation of reasoning and behaviors associated with human or rational thinking, started in 1955 at Dartmouth College, USA. The field has seen several decades of development. Some AI concepts are old but the practical implementation requires advancements in technology, computing power, and processing capabilities.

The speaker informed that AI encompasses various subfields, but most of the focus is on machine learning these days as this concept enables computers to tackle complex tasks like speech recognition, robotics, computer vision. The efficiency and capacity of the tools is far greater than traditional programming. However, training these systems is a costly and intensive process which requires significant computational resources.

*Pakistan is the fourth-largest freelancing country with 500,000 freelancers*

He highlighted the rapid development in the field of generative AI with OpenAI leading the way along with Microsoft and Google. The remarkable achievement of platforms like ChatGPT, which have garnered millions of active monthly users within a short span, demonstrate the widespread adoption of AI-driven solutions in the developed countries.

## Role of Basic Education & Related Challenges

The speaker underscored the role of basic education as building block for later learning of STEM and advanced technologies. There are some key limitations in the traditional education sector, including the quality of primary education, being more focused on learning than problem solving and disparities in the resources among schools.

*A shift towards STEM education is inevitable to improve education sector output*

Dr. Khurshid underlined some challenges such as inadequate research equipment, lack of high skilled teachers and very little opportunities for academics to collaborate with global research institutes. In addition, career opportunities in academia are very limited therefore, many talented individuals have to opt for private sector.

He suggested that involving AI in the education can be reformative through digital platforms offering videos, animations and problem-solving exercises. A shift towards STEM education by including the practices already in place in developed nations can improve the output of education sector.

## Skills Based Job Market

The speaker stressed the need of adapting rapidly evolving technologies in education to foster necessary skills in individuals and technology transfer initiatives between academia and industry to drive innovation culture.

The landscape of fields like AI and Machine Learning is constantly evolving and it is necessary for higher education to adapt these advancing technologies to remain relevant in the global market. This demands a more

*Higher Education must embrace advanced tech to stay globally relevant*

strategic approach towards education including skill-based training of teachers and supervisors to enhance analytical skills and computer literacy and rewarding effective teaching methods.

Dr. Khurshid mentioned the model of US, where through collaborations between universities and leading IT companies, companies play an active part in student placement and curriculum development. These collaborations bridge the gap between research and real-world problems.

### AI Adoption Challenges in Pakistan

The speaker explored further into Pakistan's case, emphasising the necessity to capitalize on strengths while mitigating weaknesses to seamlessly integrate AI.

For the participation of Pakistani scholars in top research projects, there has to be an effort for collaborations and identifying research problems to solve through solid undergrad education. Field like computer science and AI are inclusive in nature and can accommodate remote work and participation through overcoming societal barriers.

He apprised that Pakistan has to work on the quality of scholarship, evaluation criterias' and system of rewards in teaching and research. There is a need to promote math education with conceptual understanding and updating

*Fields like computer science and AI are inclusive, enabling remote work and breaking societal barriers* the academic program to make them closer to emerging technologies. The speaker highlighted the commitment of developed nations and major global technology firms to invest in AI initiatives

He added that in 2020, US National Science Foundation (NSF) allocated \$100 million for AI programs including machine learning foundations, trustworthy AI in weather and climate, student AI training, molecular discovery, and future agriculture resilience.

The speaker emphasised that despite the high costs associated with certain AI projects, it's essential to recognize that not all AI initiatives require such heavy investments. Many areas in AI and machine learning can progress with modest resources.

*He informed that not all AI initiatives require heavy investments*

Dr.Khurshid concluded his discussion with many recommendations such as promotion of STEM education, technology transfer initiatives investments in AI projects and reforms in higher education system.

Issues	Recommendations
<b>Basic Education Reforms</b>	
Low Quality of Basic Education	<ul style="list-style-type: none"> <li>● Investment in high skilled teachers</li> <li>● Adequate research equipment in school labs</li> <li>● Curriculum redesign with a problem-solving perspective</li> </ul>
Pre-Requisite for Development: Lack of STEM Education	<ul style="list-style-type: none"> <li>● Promotion of STEM (Science, Technology, Engineering, and Mathematics) in education sector to prepare workforce for emerging technologies like AI and machine learning</li> </ul>
<b>Collaboration Between Academia and Industry</b>	
Insufficient Collaboration between Academia and Industry for Required Innovation	<ul style="list-style-type: none"> <li>● Technology transfer initiatives and partnerships between universities and leading companies to drive innovation in related fields.</li> </ul>
Absence of Industry Input in Curriculum Development in Academia	<ul style="list-style-type: none"> <li>● Partnerships between universities and leading companies for continuous curriculum upgradation to ensure job placements.</li> </ul>
<b>Strategic Investment in AI</b>	
Lack of Investment in AI Initiatives	<ul style="list-style-type: none"> <li>● Strategic investment in AI initiatives to enhance productivity, innovation and global competitiveness.</li> </ul>
<b>Evaluation Criteria in Academia</b>	
Poor Evaluation Criteria's to Evaluate Research Output	<ul style="list-style-type: none"> <li>● Establishment of standard evaluation protocols as per the global standards.</li> </ul>
Absence of Reward System in Teaching and Research	<ul style="list-style-type: none"> <li>● Establishment of cash awards, prizes and other incentives for high quality research output and teaching methods</li> </ul>

## Digital Ethics and Cyber Security: Challenges and Way Forward

**Dr. Haider Abbas** is serving as Director General of National Cyber Emergency Response Team (National-CERT), Government of Pakistan. He received his MS and PhD in Information Security from KTH, Sweden and took professional trainings and certifications from Massachusetts Institute of Technology (MIT), United States, Stockholm University, Sweden, Stockholm School of Entrepreneurship, Sweden, IBM, USA and Certified Ethical Hacker from EC-Council. He has been appointed as 1st ACM distinguished speaker from Pakistan by ACM - Association for Computing Machinery, United States.



### Emergence of Smart Environments

Dr. Abbas highlighted the transition from traditional paper-based systems to digital assets, emphasizing how personal and organizational data is now stored on devices like PCs, laptops, and in cloud storage.

The speaker underscored the emergence of smart environments, where sensors and interconnected systems facilitate tasks like healthcare, banking, and transportation. These smart environments constitute critical infrastructure for countries like Pakistan, albeit still in development.

### AI & Big Data in Cyber Attacks

Dr. Abbas pointed out the increasing reliance on sensors in smart environments, posing risks of compromise and cyber threats. The speaker warned of the complexity of interconnected systems and the potential for malfunctions or attacks to cascade across infrastructure.

The speaker further discussed the sophistication of technologies like AI and big data, enabling sophisticated cyber-attacks that can evade detection. The data sets, including textual, graphical, and audio data, gathered online by organisations, is being used for training AI models. These models, if exploited, could be wielded for nefarious purposes, posing serious threats to security.

Moreover, the international landscape is evolving, with operational technology (OT) – the hardware and software controlling industrial systems – becoming a focal point. Predictions by Gartner suggest that by 2025, the misuse of OT could result in fatal consequences, such as passenger vehicle malfunctions or industrial accidents leading to loss of life.

### Cyberspace as a Fifth Domain of Warfare

Dr. Abbas shared the analysis of attack traffic targeting Pakistan and stated that 52% of the attack traffic originates from neighboring countries. It's a perpetual battle unfolding in the digital landscape, now acknowledged as the fifth domain of warfare.

*Unusual battery drainage, increased data usage and background noise during calls may be signs of potential surveillance*

The smartphone isn't simply a device anymore, it's a networked computer, a data repository, a photo gallery, a navigation tool, and a social media hub. Spying applications in app stores are capable of monitoring your activities and conversations without consent. Dr. Abbas

shared some tips for detecting potential surveillance or hacking, such as unusual battery drainage, increased data usage, and background noise during calls.

### Use of Pirated Softwares?

Currently, Pakistan ranks 79<sup>th</sup> globally in terms of cybersecurity readiness, with the United States leading at number one and Saudi Arabia at number two.

*Pakistan ranks 79<sup>th</sup> globally in terms of cybersecurity readiness*

The Speaker apprised that Pakistan relies heavily on imported technology and softwares', often without full visibility into potential vulnerabilities or backdoors. Pirated or cracked software further exacerbates the risk of strategic approach towards education including skill-based training of teachers and supervisors to enhance analytical skills and computer literacy and rewarding effective teaching methods.

malware infiltration. Organisations within Pakistan also face hurdles, including the widespread use of pirated softwares due to budget constraints and a lack of cybersecurity awareness programs.

### **Disconnection in Cyber Security Initiatives**

Dr. Abbas talked about cybersecurity policy in 2021, the establishment of the national cyber emergency response department and Army Cyber Command for addressing cybersecurity challenges. Additionally, academia offers undergraduate, master's, and PhD programs in cybersecurity.

The speaker apprised that organisations operate independently & there is a lack of coordination mechanism which creates significant cybersecurity challenges.

To address this issue, the national cybersecurity strategy will play a coordinating role among these organizations.

### **Current & Future Initiatives**

He said that a comprehensive cybersecurity program is in progress, including gap analyses for various organisations to identify strengths and weaknesses.

The speaker informed that advisory services have already been launched through multiple channels and a vulnerability reporting program allows employees to report security vulnerabilities for prompt resolution.

He highlighted that collaborations with international forums are underway to disseminate threat intelligence and strengthen cybersecurity measures. Also, a coordination mechanism is being developed between industry, academia, and government to develop a comprehensive national cybersecurity program.

Dr. Abbas encouraged active participation in national cybersecurity initiatives to combat cyber threats effectively.

Issues	Recommendations
<b>Data Theft Concerns</b>	
Data Hacking through Mobile Apps	<ul style="list-style-type: none"> <li>● Awareness campaign to detect potential surveillance or hacking, such as unusual battery drainage, increased data usage, and background noise during calls</li> </ul>
Pirated Softwares' Use by Organisations	<ul style="list-style-type: none"> <li>● Awareness regarding the potential threat of pirated softwares'</li> <li>● Sufficient funds for organization to purchase original softwares'</li> </ul>
Privacy of Data	<ul style="list-style-type: none"> <li>● Effective implementation of related laws to safeguard consumer data</li> </ul>
<b>Investment in IT Infrastructure</b>	
Dependence on Imported Hardware Technologies and Softwares'	<ul style="list-style-type: none"> <li>● Development of softwares' and IT hardware indigenously to fulfill market needs.</li> <li>● Allocation of sufficient funds for Research and development</li> </ul>
<b>Collaboration and Information Sharing</b>	
Disconnected Cyber Security Initiatives	<ul style="list-style-type: none"> <li>● Development and implementation of a comprehensive national cybersecurity policy</li> <li>● Establishment of platforms for information sharing, such as threat intelligence sharing networks.</li> </ul>
Lack of Awareness on Cyber Security Threats	<ul style="list-style-type: none"> <li>● Awareness campaign through a collaboration of media, academia, industry and government to aware the public on possible data security threats</li> </ul>

## Digital Ethics and Cyber Security: Challenges and Way Forward

**Mr. Humayun Bashir Tarar**, a distinguished officer of the Police Service of Pakistan, is currently serving as DIG Headquarters in Punjab Police. His career includes significant roles in FIA, CTD & Punjab Police. He holds a Master's in Public Policy from the Blavatnik School of Government at the University of Oxford and was a Hubert H. Humphrey Fellow at the Maxwell School of Syracuse University, USA.



Drawing from his extensive police service experience, Mr. Tarar informed the audience about the nature of cybercrimes, the legal and infrastructural challenges they pose, and offered practical strategies to combat the rising tide of digital offenses

### Categories of Cybercrimes within Global Cyber Space

The speaker informed that currently, there are approximately 5.3 billion internet users globally, with two-thirds of the world projected to be online by the mid of 2024. In Pakistan alone, there are around 87.35 million internet users.

Talking about the risks associated with cyber space, the speaker informed that cybercrime encompasses any unlawful activity conducted through an information system, including devices like computers and smartphones. It manifests in various forms, often leveraging the interconnected nature of the internet to perpetrate crimes at scale.

He underscored that Cybercrime can be broadly categorized into three main types: cyber-dependent, cyber-enabled, and cyber-assisted. Cyber-dependent crimes rely solely on the internet and wouldn't be possible without it, such as data breaches and identity theft. Cyber-enabled crimes leverage the internet to expand their scope, allowing criminals to commit offenses like financial fraud on a large scale. Meanwhile, cyber-assisted crimes involve the use of technology, but the crimes could still occur without it, such as theft or fraud.

### Digital Technologies & Threat of Cyber Crime

Mr. Tarar said that in Pakistan, like many other countries, the growing reliance on digital technologies is exposing individuals to cyber risks. Cybercrimes, ranging from financial scams to harassment and extortion, can

*The growing reliance on digital technologies is exposing individuals to cyber risks*

affect people across all socioeconomic strata.

He added that victims often find themselves in distressing situations, with their personal information compromised or exploited. However, it's crucial to avoid victim blaming and shaming, recognising that anyone using a smartphone or engaging online is susceptible to cyber threats.

### Legal Framework and Institutional Capacity Building

The speaker explained that in 2016, PECA was enforced to address cybercrimes including cyber terrorism, child pornography, financial fraud, and data theft. Despite its intention to protect the public from cybercrime, PECA has sparked controversy, particularly with Section 20, which criminalises defamation and is seen as draconian by human rights activists and press freedom advocates. Even financial fraud is non-cognizable, requiring court involvement for registration. The law and its investigation rules need adjustments to better address and process cybercrimes.

Mr. Tarar emphasised that the challenges in addressing cybercrime in Pakistan are multifaceted and require a comprehensive approach involving legislative reforms, capacity building, interagency coordination, and international cooperation. Crimes against individuals and organizations, both in the public and private sectors, necessitate a robust response from law enforcement agencies.

One of the key challenges is the transnational nature of cybercrime, which transcends physical and national boundaries. Criminals can operate from one country while targeting individuals or entities in another, highlighting the importance of international collaboration in combating cyber threats effectively.

*The shortage of staff in the FIA can be gauged by the fact that in 2021, more than one hundred thousand applications were filed, but only 1,224 resulted in cases*

He said that the Cybercrime Wing of the Federal Investigation Agency (FIA), responsible for handling cybercrime cases, faces a significant workload with limited staff and resources. The speaker stated that in 2021, more than hundred thousand applications were filed out of which only 1224 were resulted into cases. He added that this does not means people are lying, but many cases get closed due to unavailability of manpower.

### **Hurdles to Combat Cyber Crimes**

The speaker drew attention to the underreporting of cybercrimes and said that victims are often hesitant to come forward due to fear of retaliation, lack of awareness about reporting processes, and perceptions of unimportance associated with certain offenses. This underreporting undermines efforts to accurately assess the scale of cyber threats and allocate resources accordingly.

Mr. Tarar said that the lack of legal arrangements with major technology companies like Facebook, WhatsApp, and Twitter hampers law enforcement's ability to effectively police the internet and gather crucial evidence for cybercrime investigations. Without cooperation from these organizations, investigating and prosecuting cybercriminals becomes increasingly challenging.

Furthermore, systemic issues such as inadequate training of law enforcement personnel, and limited budget allocations exacerbate the challenges in addressing cybercrime effectively. The need for specialised training programs for cybercrime investigators, prosecutors, and judges is crucial to enhance their capacity to handle cybercrime cases efficiently.

*Inadequate training of law enforcement personnel, and limited budget allocations exacerbate the challenges in addressing cybercrime effectively.*

Overall, addressing cybercrime in Pakistan requires a concerted effort from various stakeholders, including government agencies, law enforcement, technology companies, and civil society.

Issues	Recommendations
<b>Reporting of Cyber Crimes</b>	
Underreporting of Cybercrimes due to Victim Shaming	<ul style="list-style-type: none"> <li>● Coordinated campaign by taking into confidence all stakeholders' to aware public regarding the vitality of reporting cybercrime.</li> </ul>
Lack of Awareness of Reporting Process	<ul style="list-style-type: none"> <li>● Public awareness campaign through media and community outreach initiatives to inform people about the reporting process</li> </ul>
<b>Legal Framework</b>	
A Section of Civil Society Considers Section 20 PECA – A Tool to Curtail Freedom of Speech	<ul style="list-style-type: none"> <li>● Review of the section 20 by including all stakeholders to ensure a balance between cybersecurity and fundamental rights like freedom of speech.</li> </ul>
Financial Fraud Non Cognizable under PECA	<ul style="list-style-type: none"> <li>● Review of related PECA section to make it a cognizable crime</li> </ul>
Lack of Legal Collaborations with Global IT companies	<ul style="list-style-type: none"> <li>● Establishment of legal arrangements with major technology companies like Facebook, WhatsApp, and Twitter to facilitate effective policing of the internet and gathering crucial evidence for cybercrime investigations</li> </ul>
<b>Institutional Capacity Building</b>	
Staff and Capacity Issues in FIA Cybercrime Wing	<ul style="list-style-type: none"> <li>● Allocation of sufficient resources and manpower to law enforcement agencies, particularly the Federal Investigation Agency (FIA)</li> </ul>
Lack of Specialised Training for Stakeholders	<ul style="list-style-type: none"> <li>● Training of law enforcement personnel &amp; specialised training programs for cybercrime investigators, prosecutors, and judges</li> </ul>

## Challenges and Opportunities of Digitalisation & AI with Regards to Governance, Education and Business

**Prof. Dr. Syed Sohail H. Naqvi** is the co-founder and CEO of Knowledge Streams (Private) Ltd., a new enterprise focused on the training of professionals for the IT Industry. He recently completed his term of founding Rector of the University of Central Asia, that he had joined in Aug. 2018 upon completion of five-years as Vice Chancellor of the Lahore University of Management Sciences. Prior to LUMS, he was the Executive Director of the Higher Education Commission (HEC) for eight years. In 2016, he was awarded the Sitar-e-Imtiaz by the Government of Pakistan for his services to higher education and in 2022, he was awarded the “Best of Education” award by the Ministry of Education and Science of the Kyrgyz Republic. In 2022, he was also given the Lifetime Achievement Award by the Pakistan Engineering Council.



Leveraging his vast expertise in both public and private sector, Dr. Naqvi provided an insightful perspective on digital transformation, & suggestions to reform the economy, digital infrastructure and service delivery.

### Digitisation and its Potential

The speaker said that digital transformation provides access to information, empowering individuals across all sectors. Digitization opens doors to unprecedented levels of analysis, processing, and innovation. From basic data entry to advanced AI applications, the possibilities are vast.

Talking about the transformation potential of digitisation, he shared the example of his village where poultry business has been digitized, enabling better management and decision-making.

### Parallel Cash Economy

The speaker highlighted that despite the availability of online cash transactions, people still prefer to pay with physical currency. He illustrated this preference with examples such as purchasing jewelry or building a house, where cash payments remain the norm

The implications of this reliance on cash payments are profound, extending beyond individual transactions to broader economic challenges. Pakistan's parallel cash economy exacerbates financial instability and hinders efforts to curb illicit activities.

*Pakistan's parallel cash economy exacerbates financial instability and hinders efforts to curb illicit activities*

### Integrated Data Approach

The speaker apprised that Pakistan's was the first country in the region to initiate digital identity with the establishment of NADRA, Pakistan led the way before even India began its efforts. However, while India successfully created the India Stack and integrated various systems, Pakistan struggled to achieve similar integration with NADRA and missed opportunity for streamlined digital advancement.

*Through the use of blockchain and QR codes, worktime can be drastically improved in public service delivery*

The speaker emphasised the potential of a centralised digital stack, capable of integrating essential systems and revolutionizing various aspects of public and private life.

Dr. Naqvi said that HEC verification system is not required at all, all we should do is to use blockchain technology and add QR codes to degrees. Without any hustle, anyone would be able to verify the degree from the online record. From utility bills and banking to healthcare and property management the speaker laments the existing approach, highlighting the inefficiencies and missed opportunities for data integration and analytics.

He said that India is revolutionizing service delivery and economic transactions through India Stack - which is an integration of digital identity system. Embracing similar initiatives could propel Pakistan towards a more inclusive and digitally empowered future

## The Challenges

There is a persistent gap between understanding the importance of digital transformation and implementing concrete strategies to achieve it.

The speaker stressed need for robust legal framework, particularly regarding data protection and privacy. Drawing parallels with international regulations like GDPR (General Data Protection Legislation) for European Union, Pakistan also has to safeguard data from unauthorized access.

*A robust legal framework is required to safeguard Pakistan's data from unauthorised access*

Speaking of the leadership and challenges, he informed that Pakistan's position at the bottom of various global indices reflects not a lack of knowledge or resources, but rather a leadership deficit and a reluctance to relinquish control. The excuses of ignorance or lack of guidance don't hold when reports and analyses by Pakistani professionals outline clear pathways for digital transformation.

*Pakistan will continue to lag behind in the digital transformation race if the culture of bureaucratic control and lack of trust persists*

Dr. Naqvi underscored leadership, lack of trust, culture of control and lack of desire to outsourcing as key challenges and until these obstacles are addressed, Pakistan will continue to lag behind in the digital transformation race.

The speaker advocated for a concerted effort to harness existing technologies and expertise within Pakistan to drive meaningful digital transformation.

### Top-Down and Bottom-Up Approach

Dr. Naqvi outlined the contrast between the top-down and bottom-up approaches to digital transformation, considering their implications and potential outcomes.

The Saudi Arabia's Vision 2030 outlines specific objectives for national development across various sectors, such as government effectiveness, social responsibility, economic growth, and employment and the state leads the initiative by formulating policies, programs, and investments aligned with the vision's objectives. It establishes clear frameworks for monitoring and evaluating progress. The speaker added that clarity, accountability and coordination are the main advantages in this top-down approach flexibility and citizen engagement are usually ignored.

He further added the example of Pakistan's Single Window which is a bottom-up approach for specific challenges, such as trade facilitation, through digital solutions. Local innovations, empowerment and flexibility are usually achieved but sometimes this approach lacks centralised coordination and absence of framework for upgradation to national level.

In this situation, the speaker recommended a Hybrid Approach through a combination of top-down and bottom-up approaches with Centralized leadership, local innovation and responsiveness.

### The Way Forward

Dr. Naqvi said that clear objectives and target followed by robust monitoring and accountability and meaningful engagement with stakeholders, including citizens, businesses, and civil society, is critical for success. Collaboration between government agencies, private sector partners, and international organizations can leverage diverse expertise and resources.

He advised that by considering the strengths and weaknesses of both approaches and adopting a pragmatic and adaptive strategy, Pakistan can chart a course towards successful digital transformation, unlocking new opportunities for growth, innovation, and prosperity.

Instead of waiting for governance to improve, embracing a bottom-up approach becomes imperative. This decentralised approach fosters ownership and creativity, driving sustainable outcomes at the community level.

*He said that adopting a bottom-up approach for reforms is necessary instead of waiting for governance to improve*

In conclusion, the speaker emphasised that by integrating digital identity systems, reducing reliance on imports, leveraging private sector expertise, and adopting a bottom-up approach, Pakistan can unlock new avenues for economic growth and development.

Issues	Recommendations
<b>Digital Regulatory Frameworks</b>	
Lack of Centralised Digital Identity Systems	<ul style="list-style-type: none"> <li>● Formation of data stacks to use it for various public and private sector initiatives</li> </ul>
Lack of Digital Payments Solutions	<ul style="list-style-type: none"> <li>● Investment in digital payment infrastructure and abolishment of regulatory hurdles</li> </ul>
Security of Data and Financial Frauds	<ul style="list-style-type: none"> <li>● Development of robust regulatory frameworks for cybersecurity and data privacy to address concerns associated with data security and financial frauds</li> </ul>
<b>Bottom-Up Approach</b>	
No Clear Approach to Achieve Efficient Governance System	<ul style="list-style-type: none"> <li>● Adoption of Bottom-Up approach to governance to foster ownership and creativity at the community level, driving sustainable outcomes.</li> </ul>
<b>Public Service Delivery</b>	
Reliance on Public Sector for Service Delivery	<ul style="list-style-type: none"> <li>● Leveraging the expertise and resources of the private sector for efficient and effective project executions. The government should focus on policymaking and regulation, while private firms handle implementation, ensuring accountability and innovation</li> </ul>
Slow Pace of Public Service Delivery	<ul style="list-style-type: none"> <li>● Adoption of technological solution such as Blockchain and QR codes to reduce the worktime in public service delivery</li> </ul>
<b>Domestic Production</b>	
Low Standards of Local Manufacturing	<ul style="list-style-type: none"> <li>● Embracing global standards and best practices.</li> <li>● Robust regulatory measures to ensure quality control.</li> </ul>

## Picture Gallery



## Picture Gallery



## Picture Gallery





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