Development Advocate Pakistan
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Artificial Intelligence
Transforming the Future

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Development Advocate Pakistan provides a platform for the exchange of ideas on key development issues and challenges in Pakistan. Focusing on a specific development theme in each edition, this quarterly publication fosters public discourse and presents varying perspectives from civil society, academia, government and development partners. The publication makes an explicit effort to include the voices of women and youth in the ongoing discourse. A combination of analysis and public opinion articles promote and inform debate on development ideas while presenting up-to-date information.

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AI—A Governance Priority for Pakistan

Routine-based roles such as clerks, secretaries and machine operations—jobs currently held by 42 percent of Pakistanis—could be rendered obsolete by automation.

The lightening pace of technological advancement, especially the advent and mainstream adoption of Artificial Intelligence (AI) across the globe in such a short span of time, has caught so many developing countries off guard.

Already struggling with the most basic aspects of digital transformation, these countries find themselves having to navigate a new unknown: the AI disruption. Such a rapidly evolving tech landscape has prompted the UN Secretary-General António Guterres to convene the first-ever Artificial Intelligence Action Summit in February this 2025 where he cautioned that the world "may not even be ready for the present, let alone the future."

Pakistan has a long way to go in providing equitable digital access to its population of nearly 250 million, half of which are women. Despite the country's economic and social development challenges, its people are making significant headways in technology.

The country is the fourth-largest market for freelancers in the world. The National Center of Artificial Intelligence Labs at National University of Sciences and Technology (NUST), Islamabad, has pioneered new AI-powered healthcare solutions, detecting accurately 98 percent of tuberculosis cases and 91 percent of brain tumors. Mahrose Zufran, a 16-year-old student from Rehan Allahwala AI School in Karachi, recently made headlines for using AI to create a Sindhi calculator in three days for Sindhi speaking businessmen who do not have formal education. These examples offer a glimpse of what is possible when technological investments are made to empower people.

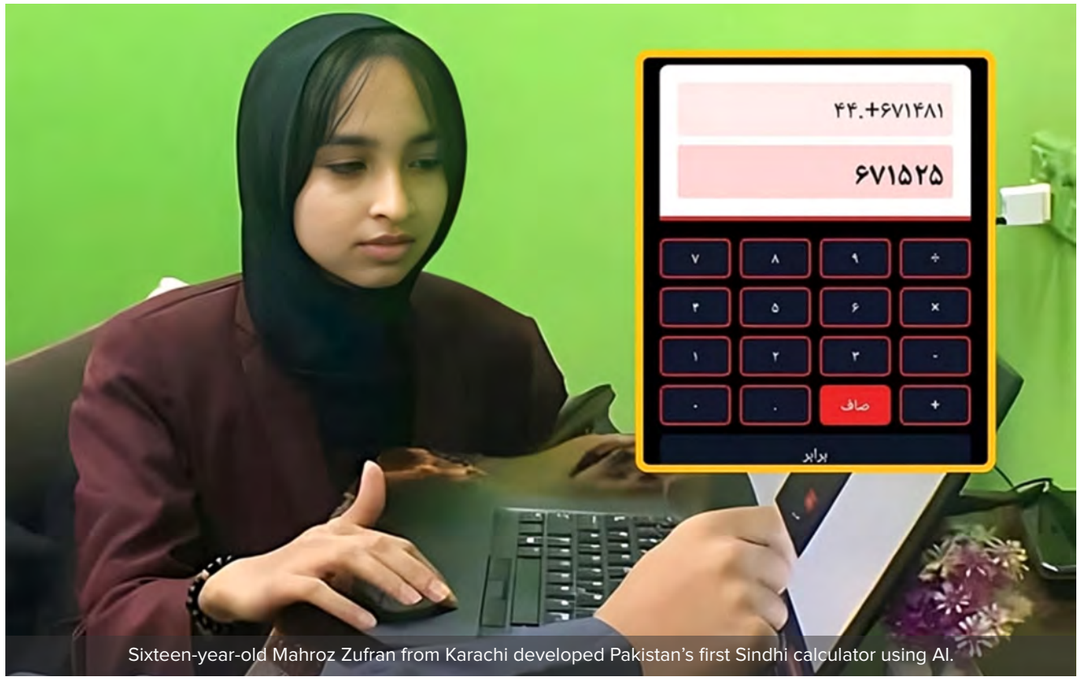
In April 2025, UNDP Pakistan National Human Development Report (NHDR) Doing Digital for Development will commemorate one year since its launch in 2024. And this year's first issue of DAP marks this milestone by exploring the AI landscape in Pakistan.

The NHDR 2024 revealed that Pakistan's entrenched wealth inequalities have deepened the digital divide, with half of the country's districts having low digital development rankings. Half of Pakistan also still lacks access to smartphones, basic internet services, and computers. The report established that without digital development, human development levels will remain low in Pakistan. This is also reflected in Pakistan's latest SDG ranking, where only 19 percent of the country's targets are on track. One bright spot in the NHDR was the effective use of digital wallets by women in Pakistan as 61 percent of women were using mobile wallets as their primary bank account.

By

Dr. Samuel Rizk

Resident Representative,
UNDP Pakistan



Sixteen-year-old Mahroz Zufran from Karachi developed Pakistan's first Sindhi calculator using AI.

Photo Credit: 360nonstopofficial

In this DAP, there's broad agreement among our contributors that as the world grapples with the challenges and opportunities of AI, the digital landscape in Pakistan is far from being a great equalizer. To do so, Pakistan should close the digital divide, ensuring that digital policies reduce inequality, and crowd in more collaboration.

At the UN Summit of the Future in September 2024, a Global Digital Compact was endorsed by Member States, including Pakistan. It offers a critical framework and roadmap for governing digital technologies and AI, focusing on three goals for inclusive digital futures: a) closing the digital divides and deliver inclusive digital economy; b) building an inclusive, open, safe, and secure digital space; and c) strengthening international data governance and governing AI for humanity.

Pakistan's Ministry of Information Technology and Telecommunications drafted a National AI Policy 2024 that aims to integrate AI into the national curriculums and offer fiscal incentives to startups and small/medium enterprises. But policy must go hand in hand with a commitment to universal internet access if Pakistan is to harness AI's benefits. This means providing affordable solutions to technology, and mobilizing investments in reliable digital infrastructure, especially in rural and underserved areas.

Pakistan must also tackle its chronic challenges in education and employment to meet the demands of AI automation. AI will create new jobs, but only for a highly specialized workforce. AI will also lead to some redundancies where 'routine-based roles' such as clerks, secretaries and machine operations—jobs currently held by 42 percent of Pakistanis—could be rendered obsolete by automation. Therefore, Pakistan must urgently invest in reskilling in AI, offering basic digital literacy for its poorer factions and reforming education to further prioritize Science, Technology, Engineering and Mathematics (STEM).

How does this all stick? When AI becomes a governance priority. Building on the 2024 NHDR's 4As framework—Access, Adopt, Anticipate, Accelerate—UNDP's pilot programming will boost SDG-aligned governance by integrating AI-augmented data systems into annual planning and budgeting, real-time monitoring, and data-informed decision-making.

There is broad agreement among our contributors that as the world grapples with the challenges and opportunities of AI, the digital landscape in Pakistan is far from being a great equalizer.

With only five years remaining for Agenda 2030, Pakistan must sprint toward AI finish line, powered by unmatched ambition and potential. 2025 can be the year to realize both.

Rewriting the Code: Women, AI and the Future of Pakistan

In Pakistan, millions of women are being left behind—excluded by algorithmic bias, limited access and gender-blind policies. This is not just a technological gap—it is a developmental fault line.

By

Van Nguyen

Deputy Resident Representative, UNDP Pakistan

As Artificial Intelligence (AI) reshapes the global future, the question is not just what it will do—but who it will serve. From Silicon Valley to South Asia, women must be part of the answer. While AI is revolutionizing economies and transforming development solutions, its power remains unequally distributed. In Pakistan, millions of women are being left behind—excluded by algorithmic bias, limited access and gender-blind policies. This is not just a technological gap—it is a developmental fault line. If the code that drives our technologies reflects the inequalities of the world around us, then we must rewrite it—with inclusion, equity and dignity at its core.

The Gendered Digital Divide in Pakistan

Pakistan ranks 45th out of 52 on the World Internet Development Index and 79th out of 120 on the Inclusive Internet Index.[1] These figures are not just statistics—they are reflections of missed opportunities and deep-rooted inequality. According to UNDP's 2024 National Human Development Report (NHDR): Doing Digital for Development, 83 percent of Pakistani women require permission from male guardians to use a mobile phone. Just 26 percent of women have internet access, compared to 47 percent of men. In rural areas, the figure drops to a mere 7 percent.

In response, the Pakistan Telecommunications Authority launched its first Digital Gender Inclusion Strategy[2] in 2024, aiming to expand equitable access. But while it is a step forward, the strategy falls short in addressing the gendered implications of AI. The draft National Artificial Intelligence Policy 2024, developed by the Ministry of Information & Telecommunication, acknowledges the need for women's skills training—but it lacks concrete targets, overlooks algorithmic bias, and is silent on technology-facilitated gender-based violence.

1. UNDP Pakistan, National Human Development Report 2024, United Nations Development Programme, 2024, [online] Available at: https://undppknhdr2024.com
2. PTA Pakistan, Digital Transformation Strategy, Pakistan Telecommunication Authority, 2024
3. Karimy, Aziz Ullah & Rasuli, Juma & Reddy, Dr & Joya, Musa & Hamdard, Ali & Ghulami, Hassan. (2024). A Review on the Feasibility of AI-Supported Education Platforms in Afghanistan: Addressing Barriers to Women and Girls' Education. 10.1109/ghtc62424.2024.10771581.

The Promise—and the Price—of AI

When designed inclusively, AI can be a powerful force for equality. In countries like India and Afghanistan, AI-powered e-learning platforms are enabling women and girls to pursue education from home, navigating around cultural constraints.[3] Maternal health applications have improved early detection of pregnancy complications, cutting risks by up to 30 percent.[4]

But AI also risks replicating—and reinforcing—existing inequalities. A 2018 Ministry of Information & Telecommunication study revealed that AI facial recognition systems misidentified darker-skinned women 34.7 percent of the time, compared to just 0.8 percent for lighter-skinned men.[5] This was not a technological glitch—it was the result of biased data collection and processing.

Other AI tools, such as virtual assistants, have echoed and amplified gender stereotypes. According to UNESCO, AI-powered voice assistants have been shown to respond submissively to abusive commands, perpetuating harmful norms about women's roles and behaviors.[6]

Following such revelations, companies like IBM and Microsoft committed to diversifying datasets and improving algorithmic accountability. These are essential steps, but public policy must keep pace. If left unchecked, biased AI could hinder women's access to employment, education, health and justice.

In addition to reinforcing social biases, AI is also reshaping the labor market—often to the detriment of women. Routine and clerical jobs, where women are overrepresented, are among the first to be automated. Meanwhile, roles in AI development, data science, and Science, Technology, Engineering, and Mathematics (STEM) fields are expanding rapidly, but women remain underrepresented. Globally, only 22 percent of AI and data science roles are held by women.[7] Without affirmative intervention, this technological shift risks widening economic inequalities. To reverse this trend, national and sectoral policies must prioritize digital skills training and STEM education for women and girls, ensuring they are not just consumers of technology but also its creators and leaders.

According to the UNDP National Human Development Report 2024, 83 percent of Pakistani women require permission from male guardians to use a mobile phone.

4. WHO, AI in Maternal and Reproductive Health, World Health Organization, 2023.
5. MIT, Gender Shades, Massachusetts Institute of Technology, 2018
6. UNESCO, I'd Blush If I Could, United Nations Educational, Scientific and Cultural Organization, 2019
7. UNDP SDG AI Lab, UNDP SDG AI Lab, United Nations Development Programme, [online] Available at: https://www.undp.org/digital/aila

Gendered Harassment in the Age of AI

Digital spaces hold the potential to empower—but for many women, they have become places of surveillance, harassment and exclusion. AI-generated explicit content disproportionately targets women, with over 96 percent being non-consensual and often used for defamation or coercion.[8] In Pakistan, manipulated AI imagery is now implicated in 30 percent of reported cyber harassment cases, with women—especially those in the public eye—bearing the brunt.[9] Alarmingly, women account for nearly 90 percent of all harassment complaints filed with Pakistan's Federal Investigation Agency, highlighting the urgent need for stronger digital protections and accountability.

The consequences are chilling. About one-third of female students and nearly half of working women report harassment online.[10] Many are forced to consider leaving school or the workforce entirely. The Prevention of Electronic Crimes Act (PECA) 2025 attempts to address these threats, but the law lacks clarity and could be misapplied in ways that stifle speech rather than safeguard victims.[11]

AI is not just a tool—it is a mirror. It reflects the values of those who design it. If we fail to act, AI could hardwire discrimination into code. But if we rise to the challenge, it can become a powerful ally in the fight for equality.

Towards a Gender-Inclusive AI Future

The 2024 Summit of the Future marked a turning point. The Pact for the Future and its companion framework, the Global Digital Compact, called on governments to remove gender-based barriers to technology and ensure that emerging tools like AI are shaped by—and serve—all people equally.

UNDP contributed to this global conversation from the ground up. In 2024, during national consultations ahead of the Summit, civil society in Pakistan issued the Islamabad Declaration, urging a people-centered approach to digital transformation—one that treats digital access not as a privilege, but as a public good.

8. UNDP Pakistan. (2024). Digital Transformation Service Offer
9. UNDP Pakistan, National Human Development Report 2024, United Nations Development Programme, 2024, [online] Available at: https://undppknhdr2024.com
10. UN Reports. (2024). AI Governance and Gender-Sensitive Policies
11. FIA Pakistan. (2023). Annual Cybercrime and Harassment Report

Access to digital skills and science, technology, engineering and mathematics education is needed so more women can shape the technologies of tomorrow.

Our Doing Digital for Development report confirms this: districts with higher digital adoption see significantly better human development outcomes.[12] That is why UNDP's '4As' framework—Access, Adopt, Anticipate, and Accelerate—centers equity, especially for women and marginalized communities, as the cornerstone of meaningful digital progress.

A Shared Agenda for Gender and AI

If Pakistan—and other nations—are to harness AI for inclusive development, gender must be at the heart of digital policies. This requires transparent and inclusive AI governance to ensure that algorithms are explainable, equitable and accountable. It demands expanded access to digital skills and STEM education so more women can shape the technologies of tomorrow. Legal frameworks must also address cyber violence and AI-enabled abuse without compromising fundamental rights. And finally, AI ecosystems must be built on ethical foundations, aligned with human rights, sustainability principles and the 2030 Agenda.

A Future Built by All, for All

AI is not just a tool—it is a mirror. It reflects the values of those who design it. If we fail to act, AI could hardwire discrimination into code. But if we rise to the challenge, it can become a powerful ally in the fight for equality.

Equitable access to technology must be recognized as a human right, with gender inclusion built in from the code to the policy. The future is not just about how we use AI—it is about who gets to build it.

12. WHO. (2023). Digital Health Equity in Low-Income Communities

Pakistan's Roadmap Towards AI for Development

By

H.E. Shaza Fatima Khawaja

Federal Minister of Information Technology and Telecommunications

Pakistan is not just catching up in the AI revolution—we are taking the lead, ensuring our digital future is built on innovation, inclusivity and sustainable progress.

Keeping in view the fast-growing developments in the field of Artificial Intelligence across the world, governments are formulating policies, strategies and regulations to benefit from the potential of AI and to overcome its associated challenges. With its enormous potential, AI carries certain risks too, and many countries such as Japan, Canada, China, US and the European Union are, in the process of, or have already introduced regulations to avoid the potential risks associated with AI.

Pakistan has been working towards integrating AI in its national strategy through different public and private initiatives including, policymaking, establishing centres of excellence and capacity building among others. Together with all the stakeholders, the Ministry of Information Technology and Telecommunication (MoITT) is committed to position Pakistan as a powerhouse in the global digital economy through innovation and ensuring universal access to digital services to realize a sustainable digital ecosystem.

To this end, the recently enacted 'Digital National Pakistan Act (DNP) 2025' is aimed at realizing the digital national Pakistan vision. With a focus on building a dynamic digital society, robust digital economy and efficient governance, this law sets the foundation for the country's digital future. It aims to capitalize on the potential of digital technologies to drive innovation, economic growth and improve wellbeing.

This landmark piece of legislation lays the foundation for a vibrant digital society, an expanding digital economy and transparent digital governance that is underpinned by a robust digital infrastructure.

The National Digital Commission (NDC), Pakistan Digital Authority (PDA), and the Strategic Oversight Committee (SOC), as envisaged in the DNP Act, will be established as a key governing body to help effectively drive our government's vision of 'Digital National Pakistan' mainly through the digitization of the economy and continuing to promote e-governance.

To be chaired by the Prime Minister, the NDC will provide strategic vision, high-level governance, and policy direction and will comprise federal and provincial members. Similarly, the PDA will work to achieve the objectives of 'Digital Nation Pakistan' and coordinate digital initiatives across federal, provincial and local levels. Moreover, the Authority has also been tasked with overseeing the secure adoption of emerging technologies such as AI, virtual assets, and cloud computing among others to help enhance digital governance and service delivery.

The National AI Policy which is being finalized through a multi-stakeholder and inclusive policy committee will soon be approved. It has the following key pillars:

1. Enabling AI through Awareness and Readiness
2. AI Market Enablement
3. Building a Progressive and Trusted Environment
4. Transformation and Evolution
5. International Cooperation

The Digital National Pakistan Act 2025 lays the foundation for a vibrant digital society, expanding digital economy, transparent digital governance and a robust digital infrastructure.

Pakistan is not working in isolation. We are actively engaging with global tech companies. We are also engaged at the bilateral level and at multilateral forums to foster AI research and development and to ensure our efforts are aligned with international norms and frameworks.

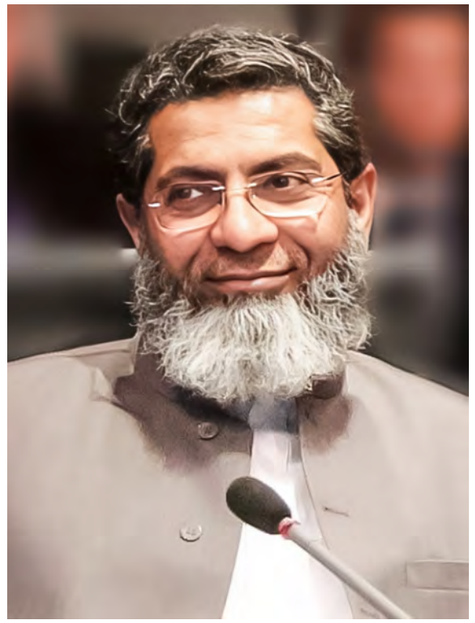
International collaboration is key to positioning Pakistan as a regional AI powerhouse. We are committed to creating an AI ecosystem that supports innovation, startups and entrepreneurial ventures. I must also share that one pillar of the draft National AI Policy is completely focused on international collaboration.

With the National AI policy nearing completion and strategic investments in AI talent, infrastructure, and innovation underway, Pakistan is on the path to becoming a regional hub for AI. AI is more than just a technological advancement, it is a revolution that will empower our youth, create new economic opportunities, bridge digital divides, and place Pakistan at the forefront of the global AI developments. The government's commitment is unwavering. Pakistan is not just catching up in the AI revolution—we are taking the lead, ensuring that our digital future is built on innovation, inclusivity and sustainable progress.

Pakistan actively solicits and advocates enhanced cooperation and collaboration within the regional and global AI ecosystem. Let us all work together to ensure that everyone—irrespective of their gender, country of origin or economic background—has an equal opportunity to the safe and secure access of this emerging technology.

Photo Credit: TeachtheWorldFoundation.pk

AI and Managing Public Governance



By

Waqar Naeem Qureshi

Director General, Information Technology Solutions, Punjab Information Technology Board

There is pressure on governments around the world to do more, do it better, and act faster–while staying within financial constraints.

The ubiquity of the internet, mobile, computing and digital platforms has led to a major shift in citizen expectations. Citizens today expect a participatory, evidence-based and time-sensitive approach to policymaking, coupled with speedy, digitized and personalized delivery of public services.

The public sector leaders respond by continuing to explore ways to improve governance with digital technologies. There have been rapid advancements in emerging technology including Artificial Intelligence (AI), robotics and tools for predictive analytics that provide promising solutions.

As public sector organizations become more data driven, the policy cycle itself continues to evolve into a framework that allows continuous evaluation and timely policy tweaking.

Better real-time data from new technologies is possible today. For instance, mobile applications, satellites, ground-sensors, internet of things, vehicles, and social media enables AI and machine learning systems to provide continuous evidence-based insights to improve policy outcomes and delivery of public services. These new technologies allow for governments to better manage citizen expectations, becoming more responsive, working at faster speeds and with much more transparency.

The adoption of AI based systems in the public sector offers exciting prospects. However, governments must continue to develop and refine AI policy and governance frameworks by ensuring the following elements below.

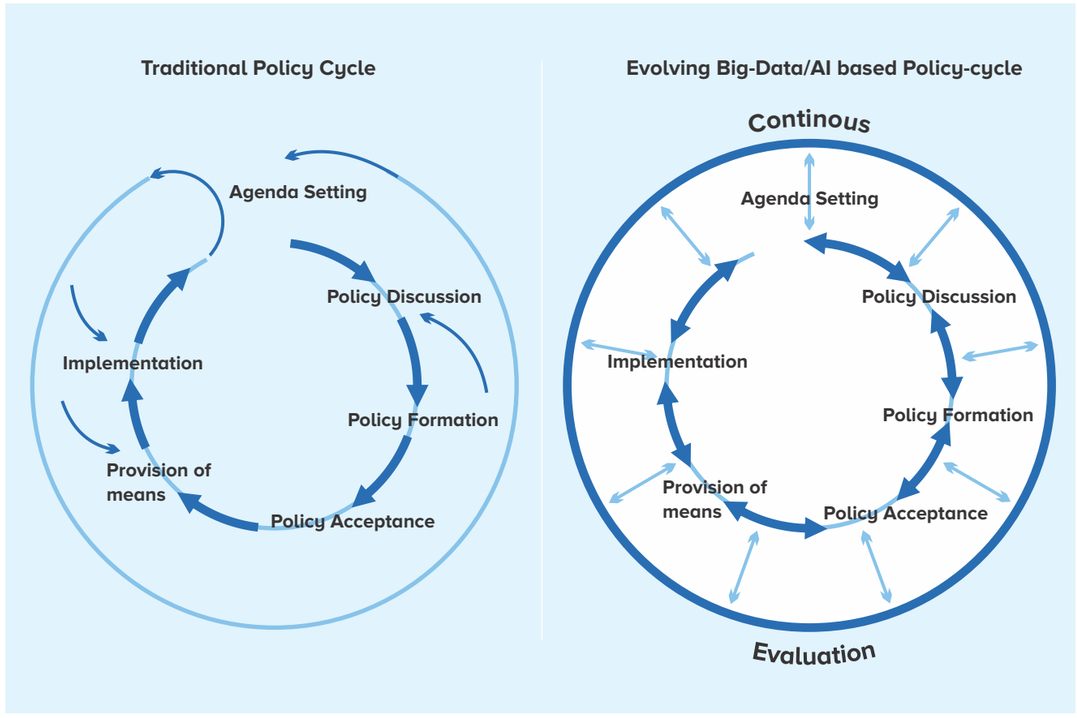
- Ethical use of AI technologies with human oversight.
- Data protection and security.
- Rights of data providers and appropriate legislation.
- Fairness and agency accountability.

The goal should be to promote human-centered use of AI systems.

Government AI Use Cases from Around the World

According to the World Bank, governments are actively integrating AI-based systems for policy improvement and delivery of public services.[1] These initiatives include:

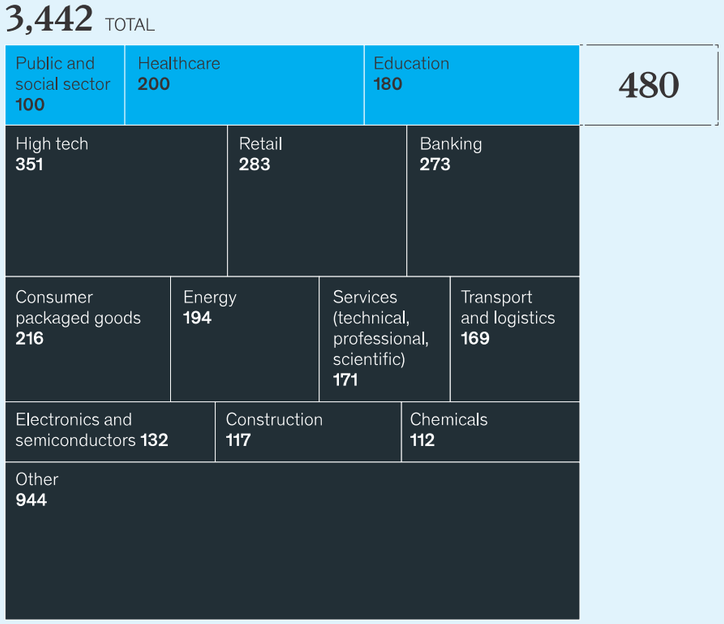
- Citizen engagement: AI has been used to analyze citizen senti-



1. World Bank, Artificial Intelligence in the Public Sector: Summary, World Bank, 2021, [online] Available at: https://documents1.worldbank.org/curated/en/746721616045333426/pdf/Artificial-Intelligence-in-the-Public-Sector-Summary-.pdf

Generative AI could have an estimated US$480 billion productivity effect on the public sector and adjacent industries.[2]

Generative AI productivity effect, by industry,[1] $ billion



[1]Excluding implementation costs (eg, training, licenses).
Source: McKinsey analysis

McKinsey & Company

AI-based systems in Pakistan are being developed for predicting crop yields by analyzing historical data, weather patterns, satellite imagery and ground sensor data.

ments from 21 million comments received on US Government's policy on NetNeutrality shared online.

- Compliance and risk management: In Armenia, AI has helped the revenue agency increase its revenue by six times.
- Fraud detection, prevention and investigation: In Brazil, AI detected 500 firms owned by the state officials responsible for supervising these firms' contracts.
- Robotic process automation: The UK Rural Payments Agency was able to process the backlog of 30,000 pension claims in two weeks, a task estimated to take thousands of hours of manual work requiring many months.
- Personalized service delivery: AI is helping countries deliver personalized public services in countries like Estonia, Denmark, UK, USA, Singapore, Korea and Japan.
- Analytics and decision-making: AI is routinely used by government regulators and financial institutions to track illicit financial flows, estimated at US$80 billion in Africa alone.

Public Sector Adoption of AI-based systems in Pakistan

In Pakistan, initiatives on adoption and integration of AI-based systems for improving public sector governance is relatively recent and entrepreneurial.

- The Government of Pakistan has enacted the Digital Nation Pakistan Act 2024. The act tasks the Pakistan Digital Authority to "carry out oversight, set standards, enforce compliance, and establish any necessary framework and processes in areas assigned by the Commission, including data management and governance, artificial intelligence, virtual assets, and other emerging technologies."[3]
- AI-based systems are being developed for predicting crop yields by analyzing historical data, weather patterns, satellite imagery and ground sensor data.
- AI models are being developed to achieve sustainable water usage by analyzing soil moisture, precipitation trends and evapotranspiration rates.
- AI systems are also being prototyped for automatic vehicle detection, license-plate recognition, and for predictive crime-analytics.

Public Sector Challenges in AI Adoption

The government faces several challenges in AI adoption in the public sector. Some key challenges are outlined below.

- There are inadequate policies and legislation on AI.
- There is still an inadequate digital infrastructure for effective and widespread AI adoption.
- There is lack of data standards and data governance.
- There is still a lack of digital talent and skills.

Recommendations

- As the internet becomes more pervasive and faster, and big-data becomes even bigger, governments must make efforts to improve overall data literacy within organizations and create a data culture.
- Appropriate legislation and AI policy formulation must be given careful attention with emphasis on data protection, rights of data providers, human oversight, transparency and agency accountability.
- Data standardization and governance are critical for achieving effectiveness and interoperability of AI systems.
- Governments should take a whole-of-government approach towards AI adoption. However, implementation should be iterative. This means identifying the problem and conceptualization, followed by rapid prototyping, deployment and then moving to scale.
- Feedback loops must be built into the design and deployment processes of AI systems at every stage.
- In addition to effective collaboration with relevant academia and the private sector, governments must take meaningful steps to attract and retain a highly capable technology workforce.

The end goal of AI adoption should be good governance.

2. McKinsey & Company, 'Unlocking the Potential of Generative AI: Three Key Questions for Government Agencies', McKinsey & Company, 2024. Available at: https://www.mckinsey.com/industries/public-sector/our-insights/unlocking-the-potential-of-generative-ai-three-key-questions-for-government-agencies

3. Government of Pakistan, The Pakistan Code, Government of Pakistan, [online] Available at: https://pakistancode.gov.pk/pdffiles/administrator2c2fd2fe7da1a657c40589a0705b3e20.pdf

Interview with

Muhammad Ahsan Younas

Deputy Inspector General of Police &
Managing Director, Punjab Safe City

"We have launched the world's first virtual women police station using AI-powered voice recognition system that connects women directlu to the station."

How has the Punjab Safe City Authority benefited from applying AI in promoting urban resilience and development? What have been the key successes so far?

It is important to define urban resilience. For us, it refers to the city's ability to anticipate, respond and recover from emergencies, crimes, and public safety threats while maintaining essential services and infrastructure. In the last year we have experimented with AI across several urban resilience initiatives with successful results.

We have launched the world's first virtual women police station which aims to make safety services more accessible. We connected the virtual police station with the emergency response system that is accessed by dialling '15'. Initially, we had used an Interactive Voice Response (IVR) system that allowed women to connect with virtual women police stations directly, however, there was a lot of traffic of male voices on the station. Therefore, we adopted the first AI solution to conduct a gender voice check.

We created options in our 15 IVR system, "1" leads to the emergency option and the "2" connects to the VWPS. When opting for option two, AI-based Gender Voice Recognition will ask for your name and city. Once an individual answers, the AI determines whether it is a male or female voice, and they are directed to the correct options. The male voice is referred to the emergency option, while the female voice proceeds with registering her concern with VWPS. As a result of the AI-enabled automated gender voice recognition, the virtual women police station remains accessible exclusively for women, enhancing safety and reducing misuse.

We have recently tested a Characteristic Based Object Retrieval (CBOR) system. This system is designed to enhance public safety through real-time person or object identification and tracking. The CBOR uses advanced machine learning algorithms and computer vision technology to identify number plates or facial characteristics that are unrecognisable by traditional surveillance systems. We can conduct prompt-based searches by applying specific prompts such as, 'find male wearing black clothes and red helmet', or even something like, 'find black Toyota Corolla with 'MashAllah' written on the back'.

We have also developed an AI-powered e-challan systems which automates the detection of traffic violations and issuing e-tickets. The system can identify 20 different types of traffic violations, this is the largest in the region.

We are also working towards issuing alerts for public mob and street fight

"We have developed an AI-powered E-Challan system that automates the detection of traffic violations and issuing of electronic tickets. The system can identify 20 types of traffic violations, this is the largest in the region."

detection. We are using a pitch and sentiment analysis on our '15' emergency calls. In a scenario where our agents or any of the citizen use abusive language, the system can detect it and generates a report. We also have a Chatbot that extracts this information.

What has success looked like for Punjab Safe City Authority in terms of accuracy of these AI-led initiative?

The accuracy of AI-led initiatives is around 90 to 93 and 94 percent. At the virtual station after 100 calls, one male call may land.

You may have seen on the media that our AI issued an e-ticket for not wearing a helmet to a vehicle. The camera was actually focusing on the driver's right where there was a motorcyclist who was without the helmet, the system confused the two.

However, the best thing about machine learning is that it improves in time. We worry about these glitches because we have a sensitive job to perform, but we also ensure to correct them immediately.

I believe, our human led system should be so dynamic that it addresses any AI false alert immediately and correctly. The moment we get to know through our own surveillance system or the person raising the complaint of a false alert we must have a dynamic response system in place to correct the mistake. We have a strong system for any grievance against e-ticketing and immediately address the issues and withdraw false tickets issued. We take a lot of pride in the fact that we immediately accept mistakes and course correct.

Chief Minister Punjab Maryam Nawaz Sharif visited the Punjab Safe City Authority headquarters.

We have spoken in detail about the initiatives that are being implemented currently. However, looking towards the future, how do you envision the Punjab Safe City Authority leveraging AI to make cities smarter and more resilient?

We are in the process of launching responsive drones on our '15' emergency systems. In any critical situation we will have a drone squad which can be air borne under 90 seconds. This initiative will backstop human effort with precision and agility.

Drones can be deployed for oversight in situations that necessitate an immediate safety and security response. They can be present at the situation and relay real-time information back to the center. We aim to incorporate within the drone a telecommunication system that allows making public announcements.

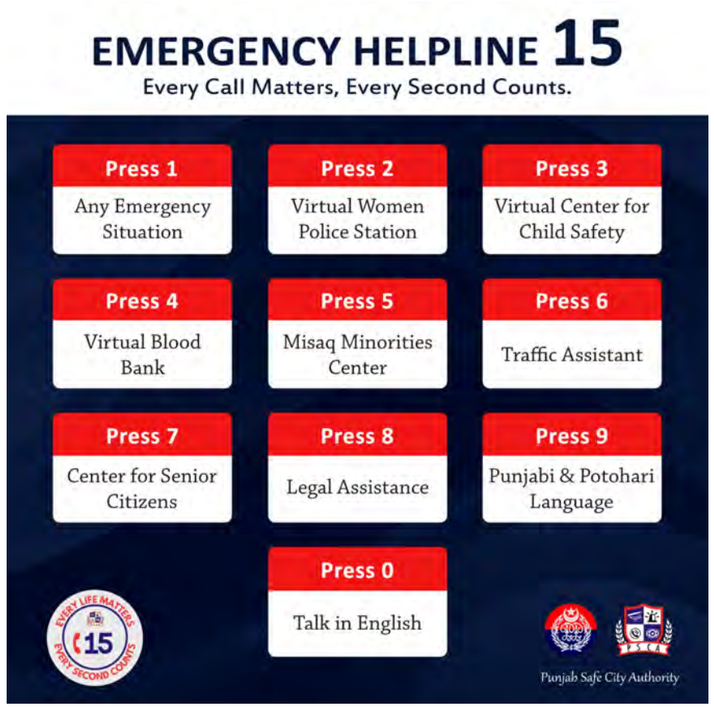
We are also looking into the streetlight issues. In places where we have our cameras installed, these cameras should detect whether a streetlight is working. It is a very small solution which we will be giving to the government soon. Similarly, we are working on a project where our camera system will issue an alert if it detects students outside during school hours.

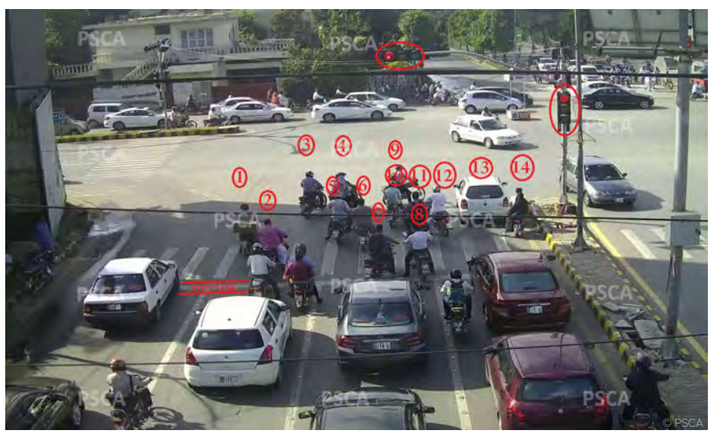
"We are ensuring our algorithms are not biased and are transparent. However, we do have to rely on previous data which is inherently discriminatory and that seeps into our data. We are aiming to eradicate this issue and develop inclusive and bias-free algorithms."

There are 101 things you can imagine with AI and the cameras, we do think that apart from security and dealing with crime, we want to contribute positively to society and implement an inclusive government approach. That is why we have given access of our surveillance systems to all the Deputy Commissioners, helping them see the civic services being deployed and the impact on well-being in society.

How do you perceive the public's readiness to use and access these AI-based services aimed at improving their quality of life? Are they ready?

It depends upon the efficacy and effectiveness of the service delivery. A good service will allow people to be open and accepting of AI-led services. If the accuracy of e-ticketing does not improve and there are false alerts, then our credibility will be low. Similarly, if the Chatbots are working well and answering public concerns, then there will be more readiness to accept AI-led services. Therefore, I think it depends on our ability to put credible and transparent AI system before the public which will determine their readiness. Generally, I do not find many complaints regarding AI-led systems. It is true that people do not like to be surveilled and taken to accountability. But it is necessary.





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We are also trying to ensure our algorithms are not biased and are transparent. We do have to rely on previous data which is inherently biased and that seeps into our data systems. We are aiming to eradicate this bias and develop inclusive and bias-free algorithms.

Has there been any public awareness, campaigns or engagement efforts to build trust in AI-powered solutions among the public?

Yes, there are many. The virtual station has helped over 340,000 women in eight months. This shows readiness as the public has accepted AI-powered solutions. And similarly, we have issued e-tickets amounting to more than PKR 1 billion. People are complying with AI-generated tickets by paying their fines. This means that the public is receptive and accepting of AI. I always say that if things work correctly, it will determine its acceptance. The more transparent and efficient the service is, the more accepting people will be. I do not think Pakistanis as a nation are aversive to technology. They are apprehensive but not averse.

Do you anticipate any challenges associated with an AI urban management?

Yes. We have multiple challenges; the biggest one is scrutiny. A false situation can land us into trouble and embarrassments, which can further lead to legal cases and public outcry. With technology, our approach is to be humble with the citizens.

And from a technological point of view, what is the biggest challenge in integrating AI within the existing systems? Be it from a point of view of infrastructure or human resource?

I think the challenge is not in creating new systems or integration within traditional systems, the real challenge is the mindsets. We must overcome the mindset which hinders some of the integrations. There are instances when people cast a bad light on good initiatives due to personal agendas, or perhaps people who might not get their desired or expected outcome from the system can present it as a biased system.

I do not think there are technology issues. I think the issue is of the mindset, but the silver lining is that with each passing day we have more successes.

"We are planning to launch responsive drones as part of our 15 emergency systems. In critical situations, a drone squad can be airborne in under 90 seconds. This initiative will support human efforts with precision and agility."

AI for Development:
UNDP Vision

We must bend the arc of AI development to ensure that AI can be harnessed for the benefit of all and does not exacerbate existing divides, reinforcing biases and concentrating technological power in the hands of a few.

By

Robert Opp

Chief Digital Officer, UNDP

Opportunities and Challenges

Artificial Intelligence (AI) has significant potential to enhance governance, improve public services and drive climate action to accelerate progress towards achieving the SDGs. In the past decade, many applications of AI have emerged, particularly in essential areas such as agriculture, healthcare and climate adaptation. For example, Crop Mate, a solution developed in Trinidad and Tobago and recognized through the UNDP Accelerator Lab's Green Innovation Challenge, provides farmers real-time AI-powered information about soil conditions and automatically recommends nutritional interventions to ensure crop health.

Yet, the rapid expansion of AI also introduces new challenges and exacerbates existing ones, including deepening digital divides, reinforcing biases and concentrating technological power in the hands of a few. The equity gap in AI is staggering. If we consider the case of AI compute, only 2 percent[1] of the world's data centres are in Africa and 5 percent of AI innovators in Africa[2] have the compute power they require.

When considering the linguistic diversity of existing AI models, many are either unavailable or underperforming for the 1.2 billion native speakers of low-resource languages.[3]

UNDP Global Vision for AI and Sustainable Development

UNDP is committed to bending the current arc of AI development towards equity and overcoming the disparities and access issues in AI. For AI to serve as a force for good, its benefits must reach those who need it the most. Building on its digital portfolio spanning 120 countries, UNDP AI efforts are focused on the following areas:

- **Data:** strengthening data governance and increasing representation of local languages in AI model design and development. Through its Local Language Accelerator program, UNDP is focused on digitizing data in local languages through locally beneficial licensing models.

1. Africa Data Centres Association, 'Data Centres in Africa: Focus Report 2024', Africa Data Centres Association, 2024, [online] Available at: https://africadca.org/en/data-centres-in-africa-focus-report-2024
2. United Nations Development Programme, 'Only Five Percent of Africa's AI Talent Has the Compute Power It Needs', United Nations Development Programme, 2024, [online] Available at: https://www.undp.org/digital/blog/only-five-percent-africas-ai-talent-has-compute-power-it-needs
3. Kocmi, T., Tezcan, A., & Federmann, C., 'Findings of the WMT 2023 Shared Task on Quality Estimation', Proceedings of the Eighth Conference on Machine Translation (WMT 2023), Association for Computational Linguistics, 2023, [online] Available at: https://aclanthology.org/2023.wmt-1.40/

- **Ecosystem capacity and readiness:** providing capacity building and technical advisory for policy development and creating locally sustainable AI ecosystems.
- **'Green' Compute:** expanding access to sustainably designed and deployed AI infrastructure, including access to green energy sources for compute and data centres to address the growing footprint of AI.
- **Trust and safety:** assisting countries to build the foundations for equitable and trustworthy AI. UNDP has launched a global program that advocates for context specific and locally relevant safeguards that prioritize local vulnerabilities.[4]
- **Partnerships and financing:** building multistakeholder partnerships and directing investments to start-ups and organizations, especially those in the Global South.

To help deliver on the above, UNDP's AI Landscape Assessments[5] provide actionable insights to support countries to address critical gaps in infrastructure, human capital, governance and capacity to help shape their national AI strategies. Through the AI Hub for Sustainable Development,[6] an initiative co-designed with the Italian G7 presidency, we are strengthening AI foundations for economic growth in Africa.

Pakistan—The AI Opportunity

Pakistan has made significant strides in digital connectivity over the past decade. According to UNDP Pakistan National Human Development Report (NHDR) 2024, Doing Digital for Development, at the start of 2024, the country had 130 million broadband users, with a mobile broadband penetration rate of 43 percent. The NHDR produced the Digital Development Index[7] that shows a strong correlation between districts that perform better in digital transformation

The UNDP AI Landscape Assessments provides actionable insights to support countries to address critical gaps and shape their national AI strategies.

4. United Nations Development Programme, 'AI, Trust, and Safety', United Nations Development Programme, 2024, [online] Available at: https://www.undp.org/digital/ai-trust-and-safety
5. United Nations Development Programme, 'AILA', United Nations Development Programme, 2024, [online] Available at: https://www.undp.org/digital/aila
6. AI Hub for Development, AI Hub for Development, 2024, [online] Available at: https://www.aihubfordevelopment.org
7. United Nations Development Programme, Pakistan National Human Development Report 2024, United Nations Development Programme, 2024, [online] Available at: https://undppknhdr2024.com

and those that have higher human development outcomes. A study by Better than Cash Alliance[8] demonstrates that full adoption of digital payments could boost Pakistan's GDP by up to 7 percent. This reflects the country's expanding digital economy.

The AI market in Pakistan is projected to grow by 27.6 percent between 2025-2030, resulting in a market volume of approximately US$3 billion by 2030.[9] The Presidential Initiative for Artificial Intelligence and Computing[10] aiming to train 100,000 students in AI, blockchain and cloud computing and the draft National AI policy[11] demonstrates the country's clear intention to employ AI for economic growth.

However, overcoming gaps in infrastructure and AI compute needs and continuing to train and upskill the workforce will be key for AI development. For instance, the largest data centre in Pakistan has a capacity of 3 megawatts (MW)[12] and the data-centre growth rate of 4.4 percent from the total current base capacity of 20 MW[13] is insufficient to meet growing AI demands. Further, funding and support are also needed to boost AI research and local AI development in the country. As per a report from the State Bank of Pakistan in 2023, only 10 percent of new IT graduates are employable in the market.[14] In addition, the country also needs to manage workforce transition accompanied by AI-led automation.

UNDP Pakistan is applying AI-based machine learning to provide the government with more precise data, deeper insights, in real-time on national development policies.

8. Better Than Cash Alliance, Realizing the Promise of Responsible Digital Payments for Merchants in Pakistan, Better Than Cash Alliance, 2024, [online] Available at: https://www.betterthancash.org/alliance-reports/realizing-the-promise-of-responsible-digital-payments-for-merchants-in-pakistan
9. Statista, 'Artificial Intelligence - Pakistan', Statista, 2025, [online] Available at: https://www.statista.com/outlook/tmo/artificial-intelligence/pakistan
10. Presidential Initiative for Artificial Intelligence and Computing, Presidential Initiative for Artificial Intelligence and Computing, 2024, [online] Available at: https://www.piaic.org
11. Ministry of Information Technology and Telecommunication, National AI Policy Consultation Draft V1, Government of Pakistan, 2024, [online] Available at: https://moitt.gov.pk/SiteImage/Misc/files/National%20AI%20Policy%20Consultation%20Draft%20V1.pdf
12. Baxtel, 'Jazz Opens New Tier III Data Center in Pakistan', Baxtel, 2024, [online] Available at: https://baxtel.com/news/jazz-opens-new-tier-iii-data-center-in-pakistan
13. Data Center Map, 'Data Centers in Pakistan', Data Center Map, 2025, [online] Available at: https://www.datacentermap.com/pakistan/
14. The Express Tribune, 'Only 10% of IT Graduates Employable: SBP', The Express Tribune, 2024, [online] Available at: https://tribune.com.pk/story/2417643/only-10-it-graduates-employable-sbp

We stand at a critical inflection point where we must ensure that we bend the arc of AI towards greater equity, both globally and at the national level.

The Path Forward

A collaborative approach with multiple stakeholders is essential for AI to truly drive development in Pakistan. Governments, private sector, civil society and international organizations must collaborate to build innovative and inclusive AI ecosystems. Our UNDP Digital Office is committed to working closely with Pakistan.

UNDP is applying AI based machine learning to provide the government of Pakistan with more precise data, deeper insights, in real-time on national development policies. The findings have revealed Pakistan's SDG progress and have been referenced in the Integrated SDG Insights Report, a national document outlining the country's SDG status. UNDP Pakistan NHDR 2024, used insights from an AI supported social risk monitor to capture real-time data informing the Report's analysis.

UNDP Pakistan has also launched a project to localize AI-driven data solutions for multi-stakeholder development planning and budgeting. The project aims to develop an integrative, generative AI platform to support government with real-time data for effective planning, budgeting, monitoring and reporting of SDGs progress across the country.

We stand at a critical inflection point where we must ensure that we bend the arc of AI towards greater equity, both globally and at the national level. The challenge ahead is not just technological, it is about governance, access and capacity. AI's benefits will not automatically trickle down, instead they must be consciously directed toward reducing inequality and supporting sustainable growth.

Acknowledgement: Jayant Narayan, AI Partnerships Consultant, Chief Digital Office UNDP, contributed to the background research for this article.

The Evolution of AI

Brief History of Artificial Intelligence

1940 — Frist digital computers built

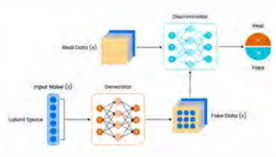
1950 — Alan Turing proposes a test to see if machines can think like humans

1956 — The term 'Artificial Intelligence' coined by John McCarthy

1997 — IBM's Deep Blue supercomputer defeats the world chess champion Kasparov

2011 — Apple's Siri is launched. Humans begin interacting with technology.

2014 — AI generates realistic images and data with invention of Generative Adversarial Networks

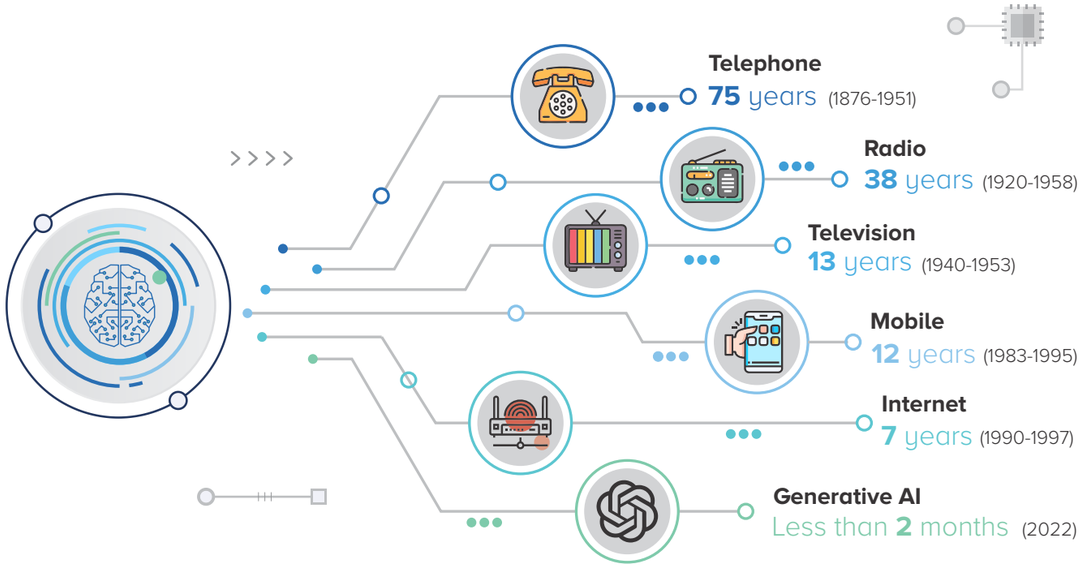


2016 — Google DeepMind's AlphaGo program powered by deep neural networks and reinforcement learning defeats Go master, a more complex game than chess

2022 — OpenAI launches ChatGPT to the public, changing communications and disrupting all sectors

Milestones

It took AI two months to reach 50 million users



Global AI for Development Frameworks

2021

UNESCO Recommendations on the Ethics of Artificial Intelligence

A framework ensuring AI systems serve humanity, benefit individuals, societies, the environment and prevent harm

2023

U.N. Secretary-General's High-Level Advisory Body on AI

Formed to undertake analysis and advance recommendations for the international governance of AI

2024

AI Action Summit (Paris)

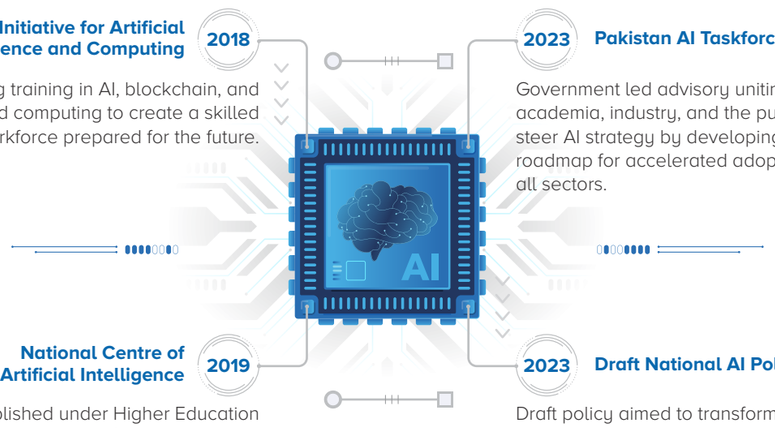
58 countries signed a joint declaration, the Statement on Inclusive and Sustainable Artificial Intelligence for People and the Planet

2024

Summit of the Future: Global Digital Compact

A comprehensive framework for global governance of digital technology and AI led by the U.N.

Pakistan AI Policies



Presidential Initiative for Artificial Intelligence and Computing — 2018

Providing training in AI, blockchain, and cloud computing to create a skilled workforce prepared for the future.

Pakistan AI Taskforce — 2023

Government led advisory uniting experts from academia, industry, and the public sector, to steer AI strategy by developing a 10-year roadmap for accelerated adoption of AI across all sectors.

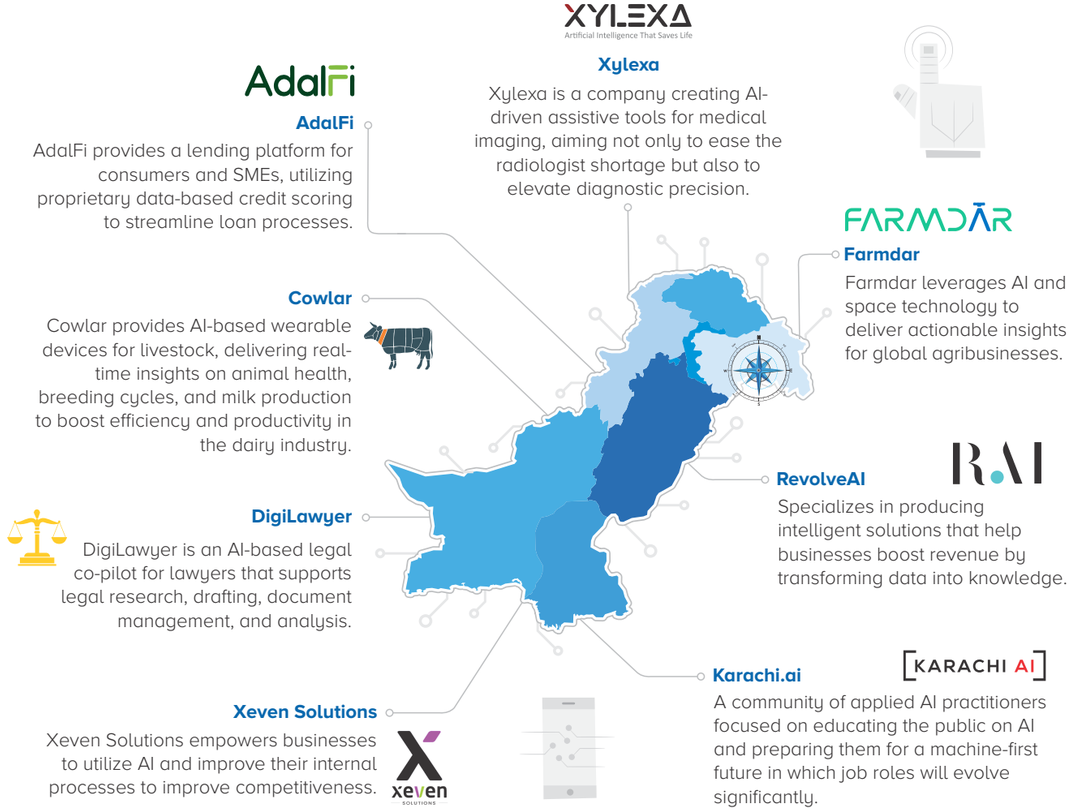
National Centre of Artificial Intelligence — 2019

Established under Higher Education Commission as a consortium of research labs to drive AI for healthcare, agriculture, and public services. Unites universities, government agencies, and industry, to enable collaborative research and strengthen Pakistan's AI ecosystem.

Draft National AI Policy — 2023

Draft policy aimed to transform Pakistan into a knowledge-based economy and foster a conducive ecosystem for the responsible adoption of AI.

AI in Pakistan



Xylexa

Xylexa is a company creating AI-driven assistive tools for medical imaging, aiming not only to ease the radiologist shortage but also to elevate diagnostic precision.

AdalFi

AdalFi provides a lending platform for consumers and SMEs, utilizing proprietary data-based credit scoring to streamline loan processes.

Farmdar

Farmdar leverages AI and space technology to deliver actionable insights for global agribusinesses.

Cowlar

Cowlar provides AI-based wearable devices for livestock, delivering real-time insights on animal health, breeding cycles, and milk production to boost efficiency and productivity in the dairy industry.

RevolveAI

Specializes in producing intelligent solutions that help businesses boost revenue by transforming data into knowledge.

DigiLawyer

DigiLawyer is an AI-based legal co-pilot for lawyers that supports legal research, drafting, document management, and analysis.

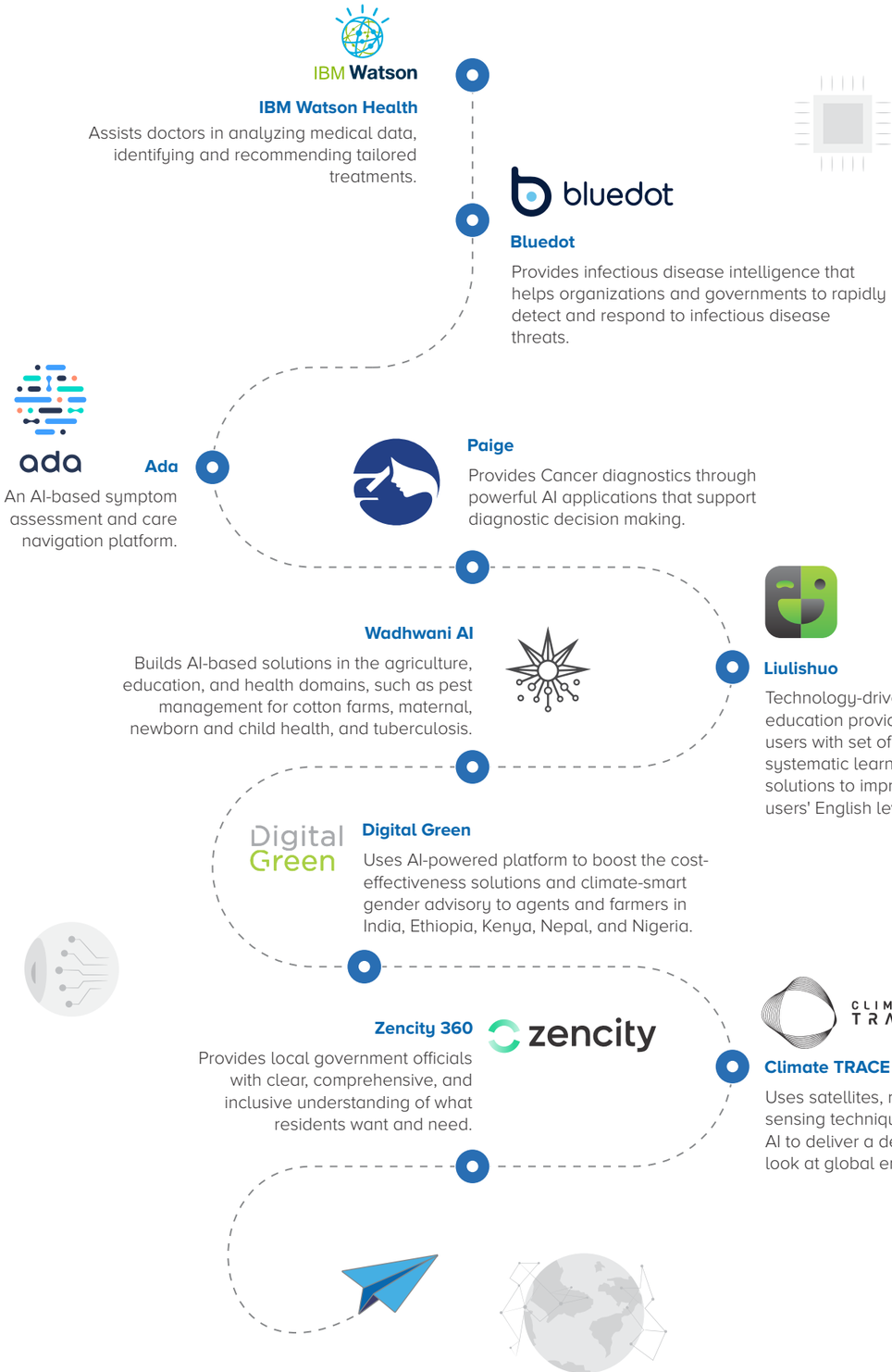
Karachi.ai

A community of applied AI practitioners focused on educating the public on AI and preparing them for a machine-first future in which job roles will evolve significantly.

Xeven Solutions

Xeven Solutions empowers businesses to utilize AI and improve their internal processes to improve competitiveness.

Global AI Initiatives



IBM Watson Health

Assists doctors in analyzing medical data, identifying and recommending tailored treatments.

Bluedot

Provides infectious disease intelligence that helps organizations and governments to rapidly detect and respond to infectious disease threats.

Ada

An AI-based symptom assessment and care navigation platform.

Paige

Provides Cancer diagnostics through powerful AI applications that support diagnostic decision making.

Wadhwani AI

Builds AI-based solutions in the agriculture, education, and health domains, such as pest management for cotton farms, maternal, newborn and child health, and tuberculosis.

Liulishuo

Technology-driven education providing users with set of systematic learning solutions to improve users' English level.

Digital Green

Uses AI-powered platform to boost the cost-effectiveness solutions and climate-smart gender advisory to agents and farmers in India, Ethiopia, Kenya, Nepal, and Nigeria.

Zencity 360

Provides local government officials with clear, comprehensive, and inclusive understanding of what residents want and need.

Climate TRACE

Uses satellites, remote sensing techniques and AI to deliver a detailed look at global emissions.

A Competition with Time

AI is propelling 'digital' by leaps and bounds through a simple metric – transitioning from the era of 'the internet of things' to the 'speed of things'. Pakistan cannot fully embark on AI's high-speed highway until the country graduates from its current Access-Adoption phase.

By

Ammara Durrani

Assistant Resident Representative,

UNDP Pakistan

Back to the Future

At UNDP, we strive for the Pakistan National Human Development Report (NHDR) to serve as premier evidence and thought leadership framework for development policy debate and practice. In 2022, coming out of the COVID-19 pandemic and in a fast-changing country context, we had several development challenges to consider. In everything we analyzed as a potential subject for our next NHDR, the phenomenon of 'digital' jumped at us. The all-pervasive presence and power of 'digital' in every national sector of Pakistan was obvious. But we also noted an absence of a normative public policy approach, in contrast to the digital industry's rapid growth.

UNDP's global Strategic Plan 2022-2025 envisioned scaling up the global development gains by propelling three specific Directions of Change: a) Structural transformation for green, inclusive and digital transitions; b) Leaving no one behind by centring human agency and development; and c) Building resilience to respond to systemic vulnerability and risk. Surviving the COVID-19 and learning from new development approaches applied during the pandemic years of 2019-2022, the Plan combined these three directions of intended change with three powerful Enablers: a) Strategic innovation; b) Digitalization; and c) Development finance.

We adopted digital transformation to become a better development organization. We then applied our knowledge in countries to help them experience better development. In Pakistan, one of our key takeaways from the pandemic was that in the post-COVID-19 era, a new digital social contract emerged to find solutions that reshape and improve traditional service delivery through technology, reaching millions. In fact, UNDP helped to adopt 580 digital solutions in 82 countries (including Pakistan) in response to the COVID-19 pandemic period of 2020-2021, including 96 data collection systems, 71 e-commerce systems, 61 e-learning platforms, and 149 e-governance systems.

All of this led to the milestone publication of the Pakistan NHDR 2024 entitled "Doing Digital for Development: 4 As of Access, Adopt, Accelerate, Anticipate". As April 2025 marks its first anniversary, it is a fitting occasion to revisit our original research question: What does 'digital' really mean as a national whole for Pakistan's society, government, businesses, international partners, and peoples?

This question was our north star to formulate a trinity of hypotheses: a)

Countries' digital transformation and sustainable development have become inherently unavoidable, mutually inclusive, and increasingly co-dependent; b) Pakistan needs to 'do digital' right, better, and faster in order to 'develop'; and c) By 'doing digital for development', Pakistan can improve its Human Development Index (HDI) indicators and outcomes for achieving inclusive, resilient, and sustainable growth.

Over the last two years – and while we are still grappling with the challenge of mainstreaming 'digital' and bridging its vast divides in Pakistan – the global thought and policy focus has fast forwarded to Artificial Intelligence (AI) as the newest frontier for countries to achieve innovation, enterprise, and growth.

Speed vs. Stuck

Today, the question is: How can Pakistan 'do AI' right and better for national development?

The UNDP NHDR 2024 showed that the existing gaps in digital access and adoption in Pakistan prevent the country from fully leveraging technology for its human development and prosperity. A country of 250 million strong, it has 87.35 million internet users, while internet penetration stands at 36.7 percent. In contrast, 150.8 million (63.3 percent) people in Pakistan do not use the internet. At this level of digital access, Pakistan is home to 71.7 million social media users, comprising 30.1 percent of the total population. There are 191.8 million (80.5 percent of the total population) active cellular connections in Pakistan.

A comparative analysis of leading global indices measuring countries' digital progress shows Pakistan lagging behind. The country ranked 45th out of 52 countries in the World Internet Development Index (2023) released by China, covering six matrices: information technology infrastructure, digital technology and innovation capability, digital economy, digital government, cyber security, and cyberspace international management. Pakistan ranked 79th out of 120 countries on Inclusive Internet Index covering areas including availability, affordability, relevance, and readiness.

In the E-Governance Development Index covering domains related to telecom infrastructure, human capital, and online services, Pakistan ranks 153rd out of 193 countries. On the Digital Quality of Life Index 2022, it ranks 96th out of 117 countries on key indicators of internet affordability, internet quality, electronic infrastructure, electronic security, and electronic government. Pakistan ranked 97th out of 113 countries on the Asian Index of Digital Entrepreneurship Systems (2021) that captures countries' general, systemic, and digital frameworks conditions for entrepreneurship.

The UNDP NHDR 2024 showed that the existing gaps in digital access and adoption in Pakistan prevent the country from fully leveraging technology for its human development and prosperity. A country of 250 million strong, it has 87.35 million internet users, while internet penetration stands at 36.7 percent.

BOX: Google's Generative AI window on "AI in Pakistan"

Search Labs | AI Overview

Pakistan is seeing increasing AI development and integration, with initiatives like the NCAI (National Center of Artificial Intelligence) fostering innovation and training, while universities offer AI programs and the government is developing a national AI policy.

Here's a more detailed look at AI in Pakistan:

Government Initiatives and Policies:

NCAI:
The NCAI, headquartered at NUST in Islamabad, is a national hub for AI excllence, focusing on innovation, research, product development , and skill enhancement through training modules.

National AI Policy:
Pakistan is working towards a national AI policy to guide responsible AI implementation, foster innovation, and address potential risks.

Ministry of Planning, Development & Special Initiatives:
A taskforce within this ministry is setting a roadmap for AI integration, focusing on developing AI infrastructure, a skilled workforce, and deploying AI-driven solutions across essential sectors.

AI Tech Parks:
The government plans to create AI tech parks to support startups and innovation, fostering the commercialization of AI solutions.

Education and Skill Development:

University Programs:
Universities in Pakistan, including LUMS and others, offer AI-related degree programs to equip students with the necessary skills.

PIAIC:
The Pakistan AI Community (PIAIC) is a platform for AI education and community building, offering programs for absolute beginners.

AICP:
The Artificial Intelligence Community of Pakistan (AICP) works in over 100 universities to spread awareness, develop a community of AI engineers, and promote a research culture among students.

AI Applications and Sectors:

Diverse Applications:
AI is being applied in various sectors, including finance, healthcare, agriculture, education, manufacturing, and smart cities.

NCAI's AI Products:
The NCAI has developed 221 AI products and designs, benefitting sectors such as smart cities, precision agriculture, healthcare, media monitoring, and the judiciary.

Job Market Impact:
AI is expected to reshape the job market, with some sectors experiencing automation and potential job displacement, while others will see new opportunities for AI professionals.

Startups and Innovation:
Pakistan's AI startup scene is growing, with companies seeking AI talent and recognizing the value of AI expertise.

Google's AI academy:
Google has launched an AI Academy program in Pakistan to support local AI startups, providing access to global AI experts and Google Cloud credits.

Challenges:

Lack of a Comprehensive AI Policy:
A clear, well-defiend AI Policy is needed to set guidelines for responsible AI implementation and address potential risks.

Shortage of Skilled Professionals:
Pakistan faces a shortage of skilled AI professionals, which needs to be addressed through education and training initiatives.

Inadequate Infrastructure:
Developing a robust AI infrastructure is crucial for supporting AI innovation and deployment.

Ethical Considerations:
Addressing the ethical implications of AI is important for ensuring responsible AI development and deployment.

Generative AI is experimental

Overall, Pakistan's rankings on these indices demonstrate major gaps and weaknesses in digital accessibility, availability, and relevance; though, it fares better on affordability.

A look at Google's generative AI window on "AI in Pakistan" shows the glass half empty (see Box). On the policy side, the narrative seems merely to have been updated by largely replacing the word 'digital' with 'AI'. Institutional approaches and policy responses reported in the media thus far do not give evidence of a focused sectoral approach, a bench-marked growth trajectory, or a clear matrix of responsibilities. The government has begun annual budgetary allocations for AI-related projects, but expenditure and impact trails are unreported and unanalyzed. The Ministry of Information Technology's 2024-25 budgetary allocation was Rs. 24 billion ($85.5 million) compared to Rs. 723 million ($2.5 million) allocations for AI in the 2022-2023 budget. The glossy idea of AI has caught policymakers' attention and fiscal patronage, but a clear action plan and experienced leadership are absent.

This is quite like how the digital sector evolved and grew in Pakistan – organically, highly unevenly, without policy coherence, and without a targeted national action plan. Successes continue to be led by the private sector and civil society, while government remains a runner-up.

Statista's data from March 2024 projected Pakistan's AI market size to reach US$861 million in 2025, compared to the U.S. market size projection of US$74 billion in 2025. Pakistan's market size is expected to show an annual growth rate of 26.28 percent, resulting in a market volume of US$3.49 billion by 2031. The country's growing use of AI is driven by a shift towards more efficient and cost-effective business operations. There is a surge in demand for AI-powered chatbots and virtual assistants, with businesses looking to automate customer service and improve efficiency. Additionally, there is a growing trend of using AI for predictive analytics and data-driven decisionmaking in healthcare, finance, and agriculture.

Today, our experiential realization is that AI propels 'digital' by leaps and bounds through a simple metric – transitioning from the era of 'the internet

of things' to the 'speed of things'. But Pakistan cannot embark on AI's high-speed highway to accrue national benefits at scale until the country graduates from its current Access-Adoption phase. AI is transforming economies and societies (mostly in the Global North) that are already in a mass state of digital readiness. Though Pakistan's neighbors, China and India, have emerged as examples of regional AI readiness and competitiveness.

Growing U.S.-China rivalry over AI is also converging with the tsunami of trade tariffs competition between the two countries (and beyond) that has risen this year following the return of President Donald Trump to the White House.

Understand the AI Balance of Power

American technology company OpenAI was founded in December 2015. Its November 2022 debut of ChatGPT, an AI chatbot built on top of OpenAI's foundational large language models (LLMs) like GPT-4 and its predecessors, succeeded in projecting artificial general intelligence (AGI) as a pop culture phenomenon in the realm of digital. Within five days, the chatbot had attracted over one million users. OpenAI defines AGI as "highly autonomous systems that outperform humans at most economically valuable work" and that also, quite ironically, "benefits all of humanity".

In January 2025, China unveiled the rival, economically cheaper, and technologically more efficient DeepSeek-R1, which has arguably shifted the AI balance of power towards Asia. The launch of DeepSeek-R1 took Silicon Valley by surprise. The U.S. AI hardware leader Nvidia's share price dropped sharply, losing US$600 billion in market value, the largest single-company decline in U.S. stock market history. The company DeepSeek reportedly recruits AI researchers from top Chinese universities as well as from outside Information Technology fields to broaden its models' knowledge and capabilities.

This growing U.S.-China rivalry over AI is also converging with the tsunami of trade tariffs competition between the two countries (and beyond) that has risen this year following the return of President Donald Trump to the White House. The Time magazine reported on April 8th that stocks in AI companies were among the biggest losers after President Trump announced sweeping tariffs on foreign trading partners in the preceding week. Owing to the AI industry's import reliance on overseas supply chains for chips and datacenter equipment, tariffs will increase its gigantic costs that are already running in billions of dollars.

As a leader of the Global South, India is also recalibrating its AI approach and footprint. There is increased policy rhetoric for India to compete with the U.S. and China, rather than risk becoming their 'digital colony' and

UN Assistant Secretary-General and UNDP Regional Director for Asia and the Pacific Ms. Kanni Wignaraja, Minister for Planning Development & Special Initiatives of Pakistan Dr. Ahsan Iqbal, Resident Representative UNDP Pakistan Dr. Samuel Rizk, and the UNDP Pakistan team launching the Pakistan National Human Development Report 2023/24 "Doing Digital for Development: Access, Adopt, Anticipate, Accelerate", in Islamabad on April 23, 2024.

With a 'low' HDI ranking of 164th out of 193 and under-developed human capital levels (comparable to Sub-Saharan Africa), Pakistan's best bet to avail AI's advantages will be to prioritize the building of human and skills competitiveness and locally relevant content that can ultimately position the country for AI readiness.

Photo Credit: AN/Fahad Maqsood Qazi

Fahad Maqsood Qazi working on the artificial intelligence dubbing system in Pakistan's southern city of Hyderabad on April 5, 2025.

using their AI systems for achieving India's targets of reaching 10 percent GDP growth by 2023 and creating a $1 trillion digital economy.

Beyond geopolitical and geoeconomic ambitions, India is also focusing on developing a homegrown AI economic model of 'startup capitalism' by equipping local firms with the necessary financial, infrastructural, and data access resources to drive national innovation and competitiveness. This approach also mirrors the sectoral and specialized 'Anticipate-Accelerate' model that the NHDR 2024 has already prescribed for Pakistan.

Prioritize a Capacity-Content Model Over Competition

With a 'low' HDI ranking of 164th out of 193 and under-developed human capital levels (comparable to Sub-Saharan Africa), Pakistan's best bet to avail AI's advantages will be to prioritize the building of human and skills competitiveness and locally relevant content that can ultimately position the country for AI readiness.

A 2024 World Bank study entitled "Global Trends in AI Governance: Evolving Country Approaches" provides a very useful policy framework for a country like Pakistan that still needs to switch from the 'Access-Adopt' lane into the 'Anticipate-Accelerate' frontier territory. The World Bank framework prioritizes five factors for policy interventions that are highly relevant for Pakistan:

- Policy Priorities and Local Context: Focus on promoting trust, protecting fundamental rights of users, increasing digital inclusion, fostering local innovation ecosystems, increasing market competition, and attracting investment.
- Maturity of AI Ecosystem: Focus on development and availability of infrastructure and human expertise, promoting good data governance, introducing baseline governance requirements, early binding measures to prevent AI risks, and harmonization with global standards.
- Legal Framework and Regulatory Environment: Focus on AI-specific provisions in data protection, cybercrime, competition, human rights law, and dispute resolution mechanisms.
- Public Resources and Capacity: Use available public resources for binding measures (more investment and skilled staff with lasting oversight mechanisms) as well as self-governance and soft law approaches (less investment with some centralized public monitoring); and
- Stakeholder Ecosystem: Include government bodies, industry participants, academia, civil society, and consumers. Ensure market trust and active participation.

On April 5th, Arab News highlighted the story of 23-year-old Fahad Maqsood Qazi from Hyderabad, Sindh who has developed previously unavailable Sindhi text-to-speech and speech-to-text AI models and has shared on open-source platforms. Fahad has bridged the AI gap for a language spoken by around 40 million people globally, including Pakistan and India.

Ignited by their self-taught passion, skills, and knowledge, let a thousand Mahroses and Fahads bloom in Pakistan for the country to meet and match AI in real time.

Guest Essay

Pakistan's Algorithm for Inclusive Development

By

Tariq Malik

Senior Advisor, Digital ID & Digital Public Infrastructure Governance

The road ahead requires continuous collaboration, investment and a steadfast commitment to leveraging AI for the nation's collective prosperity.

Artificial Intelligence (AI) is rapidly transforming global economies, and Pakistan stands at the cusp of leveraging this technology to foster inclusive development. By integrating AI into various sectors, Pakistan aims to address socio-economic challenges, promote sustainable growth and bridge existing disparities.

The United Nations has recognized the potential of AI to drive inclusive development, particularly through initiatives led by the UNDP and the United Nations Department of Economic and Social Affairs (UNDESA). The U.N. Secretary-General António Guterres has emphasized AI's role in achieving the SDGs, calling for ethical AI governance that benefits all. This is particularly relevant for Pakistan, which faces severe climate injustice. Recall the 2022 floods, described as the worst in the country's history that affected over 33 million people and caused damages exceeding US$30 billion. AI-driven disaster management tools—such as predictive analytics, satellite monitoring and early warning systems—can play a critical role in mitigating future climate-related disasters, helping Pakistan build resilience and better allocate resources in disaster-prone areas.

Ethical AI Governance: A Crucial Consideration

As AI continues to advance at an exponential rate, it serves both as a potential disruptor and a critical enabler of sustainable development. While technological advancements are no longer a bottleneck, the biggest concerns remain human-centric—ensuring its ethical use, governance, and alignment with human values. Ethical AI is an all-encompassing issue, influencing decision-making, governance structures, technological capacity-building and inclusiveness. Pakistan's strategic roadmap for AI must clearly define its scope to address these concerns and incorporate guiding principles for the entire AI lifecycle.

The digital divide presents another challenge, leading to disparities in AI adoption across countries. I remember working as Chief Technical Advisor at UNDP headquarters in New York, in 2021 when Covid-19 pandemic was at its peak. From the over 200 digital responses to COVID-19 that UNDP supported globally, fewer than 20 were AI-enabled—six involving AI/machine learning and 11 using chatbots—largely due to gaps in digital connectivity and capacity in developing nations.

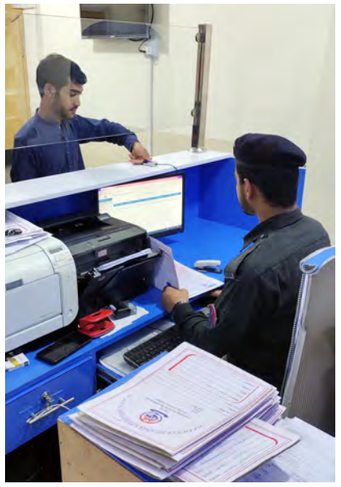
In terms of connectivity challenges, Pakistan has a digital divide as well. To bridge this gap, Pakistan must collaborate with international development partners such as the UN agencies and the International Telecommunication Union (ITU). Engaging with the UN's High-Level Panel for Digital Cooperation's recommendations on digital capacity development including, conducting mapping exercises, establishing multi-stakeholder networks and creating joint facilities. Such combined efforts can enable Pakistan to strengthen its AI ecosystem.

NADRA has helped senior citizens receive pensions, conduct banking transactions and apply for services without biometric verification issues using AI. This is the first Pakistani public service organization that has applied AI to enhance accessibility and inclusivity.

Pakistan can also actively participate in global initiatives like 'The Partnership on AI to Benefit People and Society', which brings together non-profit organizations, industries and academic institutions to establish best practices for the ethical use of AI. Such international cooperation will help Pakistan build an AI ecosystem that is equitable, transparent and aligned with global ethical standards.

AI-based Innovation for Senior Citizens at NADRA

An outstanding example of AI-driven service delivery in Pakistan is the National Database and Registration Authority's (NADRA) AI-based eKYC solution for senior citizens. When I assumed the office as Chairman NADRA in June 2021, I realized that many older individuals, especially



farmers, and women working in the fields, all faced difficulties with biometric verification due to their fingerprints being submerged or unreadable by Automated Fingerprint Identification Systems (AFIS). NADRA's stellar engineers developed an AI-based solution that asks random questions based on your family tree stored in the database that only person whose identity is being authenticated knows the correct answers to. This

© UNDP Pakistan

innovative AI-powered system facilitates Know Your Customer (KYC) procedures, ensuring that elderly citizens can access essential services seamlessly.

By leveraging AI, NADRA has reformed service delivery[1], enabling elderly individuals to receive pensions, conduct banking transactions and apply for eligible services without facing biometric verification issues. This initiative marks the first instance of a public service organization in Pakistan utilizing AI to enhance accessibility and inclusivity.

National AI Policy: A Strategic Framework

In May 2023, Pakistan's Ministry of Information Technology and Telecommunication introduced the Draft National AI Policy[2], marking a significant step towards a knowledge-based economy. This policy aims to create a conducive ecosystem for the responsible adoption of AI, focusing on transparency, accountability and inclusivity. It emphasizes the importance of data privacy, security, and fairness in AI systems ensure that AI benefits all segments of society.

Economic Transformation through AI

The "Uraan Pakistan" initiative[3], launched in 2024, exemplifies the country's commitment to economic revival through technology. This economic transformation plan targets a sustainable, export-led GDP growth of 6 percent by 2028, with AI playing a pivotal role. By prioritizing sectors such as agriculture, energy, textiles, pharmaceuticals, and IT, Pakistan aims to enhance export competitiveness and optimize public finances.

Educational Initiatives: Building AI Competence

Recognizing the need for a skilled workforce, Pakistan has launched several educational programs to promote AI literacy. The Presidential Initiative for Artificial Intelligence and Computing (PIAIC) offers training in AI, blockchain, Internet of Things and cloud-native computing. With an initial target to enroll 100,000 students annually, PIAIC provides both on-site and distance learning opportunities,

Bridging the digital divide is paramount to ensure AI benefits are equitably distributed. This requires investments in digital infrastructure, especially in rural and underserved areas, to provide reliable internet access, and implement digital literacy programs.

Photo Credit: AP/Muhammad Sajjad

1. GNN, 'NADRA Introduces AI-Based Fingerprints Solution for Elderly', GNN, 2024, [online] Available at: https://gnnhd.tv/news/18140/nadra-introduces-ai-based-fingerprints-solution-for-elderly
2. International Bar Association, 'Pakistan Draft National AI Policy: Fostering Responsible Adoption', International Bar Association, 2024, [online] Available at: https://www.ibanet.org/Pakistan-draft-national-ai-policy-fostering-responsible-adoption?utm_source=chatgpt.com
3. World Economic Forum, 'Pakistan's Economic Revival: Sustainable and Inclusive Growth', World Economic Forum, 2025, [online] Available at: https://www.weforum.org/stories/2025/01/pakistan-economic-revival-sustainable-and-inclusive-growth/?utm_source=chatgpt.com

ensuring accessibility across the nation. There is a need that these programs must continue beyond electoral cycles.

Additionally, UNESCO's recent Masterclass series[4] in Pakistan addresses pressing issues by fostering information sharing and knowledge transfer. The inaugural episode, 'Harnessing the Era of Artificial Intelligence for a Sustainable Future,' engaged over 200 participants from academia, emphasizing Pakistan's vision to leverage AI for socio-economic growth. This shows a strong interest of Pakistani tech enthusiasts to learning new frontiers of ethical use of AI.

Challenges and the Road Ahead

While the prospects of AI in promoting inclusive development are promising, Pakistan faces several challenges. Bridging the digital divide is paramount to ensure that AI benefits are equitably distributed. This requires investments in digital infrastructure, especially in rural and underserved areas to provide reliable internet access and digital literacy programs.

Ethical considerations also play a crucial role in AI adoption. Ensuring data privacy, preventing biases in AI algorithms and establishing regulatory frameworks are essential steps to build public trust in AI systems. Though the government has emphasized Pakistan's commitment to ethical AI development, advocating for global collaboration on responsible AI governance to benefit all societal segments is critical.[5] Intentions, goals and objective should match actions. The recent internet disruptions, arbitrary shutdowns, and restrictions on social media platforms risk discouraging AI adoption and international investment in Pakistan's IT sector. Such actions create uncertainty for businesses and hinder the development of a robust digital economy, making it imperative for policymakers to ensure an open and stable digital environment.

Policymakers must ensure an open and stable digital environment.

Conclusion

Pakistan's journey towards integrating AI for inclusive development is marked by strategic policies, educational initiatives, and a focus on ethical considerations. By harnessing AI's potential, Pakistan aims to address socio-economic challenges, promote sustainable growth, and ensure that technological advancements uplift all segments of society. The road ahead requires continuous collaboration, investment, and a steadfast commitment to leveraging AI for the nation's collective prosperity.

4. UNESCO, 'UNESCO Engaged Higher Education Institutions Across Pakistan to Discuss Artificial Intelligence', UNESCO, 2024, [online] Available at: https://www.unesco.org/en/articles/unesco-engaged-higher-education-institutions-across-pakistan-discuss-artificial-intelligence?utm_source=chatgpt.com
5. Digital Pakistan, 'Pakistan Commits to Ethical, Inclusive AI Development', Digital Pakistan, 2024, [online] Available at: https://digitalpakistan.pk/pakistan-commits-to-ethical-inclusive-ai-development/?utm_source=chatgpt.com

A Brave New World: Trends & Debates

By **DAP Team**

“Let us move for an AI that is shaped by all of humanity, for all of humanity.”

U.N. Secretary-General António Guterres quoted from his speech, Great Power, Greater Responsibility at the AI Action Summit in France, 11 February 2025

This is the first time in history where humans will not be creating information. What does this mean for the world? Below are key trends and debates.

The End of Human History?

- **AI is influencing our opinions.** AI will have immense influence on our opinions and world views as more people use AI as a one-stop shop over Google, says philosopher Yoval Harari for the Economist. People will gain news from AI, replacing traditional media and the advertiser. This means humans will no longer dominate the spread of information. Previous tools like the printing press and radio helped spread human views, now AI is going to spread AI generated ideas and culture.

- **DeepSeek’s cheaper model will bring AI to the world faster.** DeepSeek launched a cheaper AI, this model is as good as those made by Google and OpenAI and have been produced at a fraction of the cost. For AI to transform society, it needs to be cheap, ubiquitous and out of the control of any one country or company. DeepSeek’s success suggests that such a world is possible.

- **A smarter AI is about to launch, and Silicon Valley experts are worried.** A general-purpose A.I. system (A.G.I), will be released that will perform all cognitive tasks of humans. This means AI systems will be smarter than humans at almost everything. Silicon Valley experts building AI are worried at how fast it improves. They worry about the harms this technology is set to bring for humans.

Replacing Human Workforce, or Human-Machine Collaboration?

- **AI-powered platforms replacing entire video, design and communications teams.** Platforms like Runway ML and DALL-E empower creators to generate realistic images, videos and animations without requiring traditional design expertise. It is now possible for one person to create a short film and design products.

“In a decade perhaps everyone on earth will be capable of accomplishing more than the most impactful person can today.”

Sam Altman quoted from The Economist, How AI will Divide the Best from the Rest, 13 February 2025

- **About 41 percent of companies worldwide plan to reduce workforces by 2030 due to AI.** This data is according to the World Economic Forum in 2025, they have found that jobs of secretaries and payroll clerks are experiencing fastest decline. AI is replacing coders, with coders only supervising AI.

- **There is expected to be a rise in ‘human-machine collaboration’.** AI could empower less specialized employees to perform range of expert tasks such as accounting clerks, nurses and teaching assistants. Technology could also equip highly specialized professionals such as engineers and doctors to solve complex problems more efficiently.

- **AI is making breakthroughs in health.** AI-driven tools like IBM Watson Health assist medical professionals in diagnosing diseases quickly and early, and recommending specialized treatments with greater precision.

The End of Creativity, or the Start of a New Movement?

- **The world's first AI powered humanoid robot artist sells at more than US$1 million.** Ai-Da, a humanoid robot sold her work at Sotheby’s New York on 7 November 2024, it is the most valuable artwork ever sold by a robot artist. These trends have posed several questions, why should AI’s art not be called art? What is the role of the human experience behind art?

- **Will musicians be played out by AI?** Platforms like Spotify are using AI generated music to cut costs. The models used to train AI are using unlicensed datasets from the internet and music platforms, violating copyrights of millions of artists.

The Loss of Human Connection

- **Can machines ever replace human connection?** There is now increased risk of social isolation, weakening of social skills and bonds as AI integrates into every aspect of life. Potentially positive AI solutions to help loneliness include loneliness robots for adults, and Woebot apps that offer mental health support. Results are mixed.

The World is Not Ready for AI

- **Calls are being made to regulate, as of yesterday.** As AI becomes more powerful, it is critical to have safety checks before AI tools are released in public.

Ai-Da with her paintings at a United Nations event in Geneva.
Courtesy Ai-Da Robot Studios

- **Reskilling is urgent.** Workforce needs to be reskilled through government programs and within organisations. In addition, emotional support is also required for people whose skills will become entirely obsolete due to AI. Finally, AI education in schools must be mandatory.

- **Address biased AI systems.** AI systems are trained on data, and if that data reflects existing biases, the AI will perpetuate and even amplify those biases. This can lead to discriminatory outcomes in areas such as hiring, lending and criminal justice.

“I don’t worry about individuals overpreparing for Artificial General Intelligence either. A bigger risk, I think, is that most people won’t realize that powerful AI is here until it’s staring them in the face — eliminating their job, ensnaring them in a scam, harming them or someone they love.”

Kevin Roose quoted from The New York Times, Why I’m Feeling the A.G.I., 14 March 2025

Pakistan's Blueprint for Transformation

Pakistan's young population is a demographic advantage that can be maximized by investing in AI literacy and skill development.

By

Dr. Kyle Gardner

Government Affairs & Public Policy Lead, South Asia, Google

Artificial Intelligence (AI) stands as a transformative force with the potential to reshape societies, economies and individual lives. Pakistan with its burgeoning Information Technlogy (IT) sector, sizable population, and growing digital connectivity, has a unique opportunity to harness the potential of AI to drive substantial benefits across all sectors. However, realizing these benefits requires a comprehensive and forward-thinking policy approach that addresses infrastructure, human capital and widespread AI adoption.

The Promise and the Challenge

The AI promise lies in its capacity to augment human capabilities, solve complex challenges and drive innovation. From healthcare to education, AI can revolutionize sectors, improve public services and enhance people's quality of life. Take AlphaFold, Google DeepMind's AI system that uncovered the 3D structure of 200 million proteins–the building blocks of life. That single initiative has accelerated research in nearly every field of biology, speeding up progress for real-world problems including finding new drugs to treat liver cancer, developing fully effective malaria vaccines and breaking down single-use plastics.

Pakistan has also made significant strides in revolutionizing the healthcare sector with the introduction of AI technology. The National Center of Artificial Intelligence has used AI to make several breakthroughs that include designing cancer diagnostic tools and early detection of brain tumor, tuberculosis and breast cancer.

However, unlocking the full potential of AI also requires addressing challenges such as public trust, the risks of potential job losses and the need for a more robust infrastructure. Therefore, a proactive approach is essential to mitigate risks, ensure ethical AI use and foster an environment conducive to innovation.

Invest in AI Infrastructure and Innovation

A cornerstone of Pakistan's AI strategy should be substantial investment in research and development, digital infrastructure and computing capabilities. Building a strong AI ecosystem requires collaboration among the government, industry and academia. While the development of AI systems is costly, its deployment is not. Cross-

A cornerstone of Pakistan's AI strategy should be substantial investment in research and development, digital infrastructure and computing capabilities.

border data flows across dependable internet infrastructure can ensure that Pakistani businesses of all sizes, as well as individual users can benefit from this technology.

Fostering a pro-innovation legal framework is crucial. Strategies can include intellectual property policies that encourage AI development while safeguarding data privacy and security. Aligning regulatory approaches with international standards is also key; these best practices will attract investment and facilitate collaboration with global AI leaders.

Build an AI Empowered Workforce

Pakistan's young and growing population is a demographic advantage that can be strengthened by investing in human capital. Therefore, developing education and skilling programs to incorporate AI literacy and skills is essential. Initiatives such as the DigiSkills.pk are a step in the right direction. However, additional programs are needed to equip the workforce with the skills required to thrive in an AI-driven economy.

Collaboration between industry and academia is vital to ensure that educational programs align with industry needs. Additionally, supporting workers in transition through reskilling and upskilling initiatives will help mitigate potential job displacement and ensure a smooth transition to AI-integrated workplaces.

Promote Widespread Adoption and Universal Accessibility

Government efforts to adopt AI can play a crucial role in demonstrating its benefits and building public trust. Implementing AI solutions in public services such as healthcare, education and transportation can improve efficiency and service delivery. Encouraging small businesses and traditional industries to adopt AI through targeted incentives and support programs can enhance their competitiveness and drive economic growth.

The Government of Pakistan's draft National AI Policy is a positive step. However, its successful implementation requires collaboration and coordination among the different stakeholders. A clear roadmap with measurable targets and timelines is essential to track progress and ensure accountability.

Towards an AI-Enabled Future

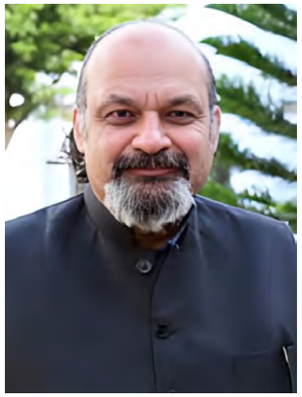
Realizing the potential of AI in Pakistan requires a multi-faceted approach that addresses infrastructure, human capital and regulatory frameworks. Pakistan can position itself as a leader in the AI-driven global economy by investing in AI research, fostering a skilled workforce and promoting widespread AI adoption.

The government must champion this transformative agenda in collaboration with industry and academia. By embracing approaches that ensure AI is implemented responsibly and strategically, Pakistan can create a future where AI serves as a catalyst for economic growth, social progress and human development.

Aligning regulatory approaches with international standards is key in attracting investment and collaboration with global AI leaders.

Will AI Pass with Flying Colors?

If we are to use AI effectively, to deliver on its promise, we will have to train and, or, retrain most of the teachers.



By

Dr. Faisal Bari

Associate Professor of Economics & Education, Lahore University of Management Sciences & CEO/Senior Research Fellow, Institute of Development & Economic Alternatives

Artificial Intelligence (AI) enthusiasts are excited about what AI will be able to do in education. Many, especially teachers, fear what the advent of AI, in education, could mean for their jobs. But, as of now, the conversation is at the level of possibilities and fears only, as few seem to know what the real potential of AI in education is.

AI in education seems to be promising four main things. AI based education system can widen access to educational services, it can ensure access to quality education, it can create individualized learning pathways for individuals, and it is expected to be a lot more cost effective compared to the systems we have. So, AI could make access to quality education for all more of a possibility and could do it cheaper than what countries are doing it for right now. This is, at least for now, the promise.

If any or all of the above happen, or happen to a degree even, it will definitely mean major changes in the education landscape and educational systems. The current roles of schools, universities, teachers, pedagogical practices, examinations, and ways of learning, all will change and quite significantly.

The above have not yet happened in high-income countries even: there too we are largely talking of potential and only early forays are being made. There will need to be a lot of work that will be needed before major changes, if any, come to developing countries like Pakistan.

We will need significant investments in internet and information technology infrastructure before AI based systems can be reachable even for students enrolled in schools and universities. To make them accessible to out-of-school children, the investments in internet, devices and other infrastructure will have to be even more extensive. As of now, it is hard to have enough bandwidth to provide decent speed and stable internet even in major cities like Karachi, Lahore and Islamabad, to do so in smaller cities or rural areas is not possible right now and will take time and significant effort from the government.

Educationists, teachers and policymakers must embrace the possibilities of what AI might offer openly, and in the spirit of experimentation and learning.

Most teachers, currently, do not know of the possibilities AI opens up or are afraid of what AI might mean for their jobs and profession. At a minimum many feel AI will lower their status from 'teacher' to a 'facilitator'. They will no longer be the figure of knowledge and authority in class, they will just be a monitor or facilitator of one sort or another. At the extreme, many feel teachers will be replaced by AI-based agents. AI agents will be able to 'guide' and educate students better, they would even be able to counsel students better and, maybe, even be better role models for students. If AI agents get this sophisticated, economics and cost reasons will certainly drive displacement of human teachers.

But, fear aside, AI opens up new avenues for structuring education. Our teachers are not trained in information technology (IT) and use of AI. IT and AI are alien to most of them and hence induce even more fear. If we are to use AI effectively, to deliver on its promise, we will have to train and, or, retrain most of the teachers. IT and AI has to become a tool that teachers internalize in their thinking about teaching, actual teaching and in their pedagogical practices. This will require major medium-term and sustained training programs for current and future teachers.

There is a difference in the use of AI in schools versus universities. In schools AI should come into schools and teaching through teachers and, or, integrated into teaching and learning through school designed systems. Whereas in universities faculty and university administration should do that, but a lot of AI possibilities can be used by the students directly and on their own. Students over 18, are mature, have more autonomy and, hence, should have more responsibility as well.

The future is always hard to predict. In times when change is fast, it is even harder to predict. We are at the start of the AI intervention. It is, as of now, hard to see the depth and breadth of what might be possible through AI in education. But a few things are still clear. We will need a lot of investments in infrastructure, devices and teachers to exploit the potential of AI in any meaningful sense. AI will be disruptive, it is hard to see the extent of it right now, but it will definitely be disruptive. Fear of AI will only make matters worse. Educationists, teachers and policymakers will need to embrace possibilities openly and in the spirit of experimentation and learning. Only then will we know what the potential is and only then will teachers be able to utilize it effectively.

Karachi's Happy Palace private school introduces Anny, Pakistan's first-ever AI-powered robot teacher, marking a revolutionary step in education.

Photo Credit: Happy Palace Group of Schools

We will need a lot of investments in infrastructure, devices and teachers to exploit the potential of AI in any meaningful sense.

Who Controls & Regulates Technology?

The tech-industrial complex encapsulates the entanglement of technology, corporate power, and state interests that are shaping the 21st century global order. Who controls and regulates technology?

By

Muhammad Abbas Taqi

Data & Analytics Officer, Development Policy Unit, UNDP Pakistan

On January 17, 1961, U.S. President Dwight Eisenhower delivered his farewell address on national television, warning the American people about the dangers of a "military-industrial complex." He cautioned, "the potential for the disastrous rise of misplaced power exists and will persist."

Sixty years later, on January 15, 2025, President Joe Biden, in his farewell address, warned of the rise of a "tech-industrial complex", and said that the U.S. was turning into an oligarchy, where tech billionaires held dangerous levels of power and influence, "enabling the abuse of power." His warning came as President-elect Donald Trump prepared to begin his second term with an administration dominated by tech industry leaders.

The proliferation of technologies has always been at the root of power. The military-industrial complex was informed by technological breakthroughs in space exploration, telecommunications, electronics and computing, among others. The rise of the "tech-industrial complex" was accelerated through the rise of Silicon Valley and the nineties internet boom. The tech-industrial complex encapsulates the entanglement of technology, corporate power and state interests that are shaping the 21st century global order. In other words, it raises critical questions about who controls and regulates technology?

Techno-Feudalism

Today there are a handful of companies that control the digital economy. Otherwise known as 'Big Tech', companies such as Google, Amazon and Meta are ubiquitous and among the world's most profitable. This has triggered fears by experts, of the rise of a new form of 'feudalism' where big tech controls our digital ecosystems, from search engines and social media platforms to cloud computing infrastructure.

Yanis Varoufakis, the renowned Greek politician and economist popularised the term 'techno-feudalism'. In this new digital feudal system, users generate value through their data but have little control over how it is used. Small businesses, too, are often fully dependent on these platforms as they rely on them for visibility and sales. Even governments are increasingly dependent on tech companies for essential services, from cloud storage

to data mining and analytics. This concentration of power in the hands of a few corporations poses significant risks to governance, democracy, competition and innovation.

Arrival of Artificial Intelligence

Now, add to this the immense power of Artificial Intelligence (AI) technologies - perhaps the most consequential technology of our time. The development of AI is as fundamental as the creation of the microprocessor, the personal computer, the internet, and the mobile phone. It offers profound possibilities and risks for the economy, security, society and our very humanity. AI is a general-purpose technology that will shape all sectors of the economy. Entire industries will reorient around it. Businesses will distinguish themselves by how well they use it. It will change the way people work, learn, travel, get healthcare and communicate with each other.

Big tech companies such as Microsoft, Meta, Amazon and Alphabet are collectively expected to pour over US$200 billion in capital investment in AI this year, with plans to spend hundreds of billions more in the coming years.[1] They will build upon their tech infrastructure, and solidify that dominance with AI. AI also requires access to Big Tech's cloud computing platforms such as Amazon Web Services, Microsoft Azure and Google Cloud. This dependency should raise legitimate concerns. Therefore, steering the technology's development towards the common good is an urgent need.

It is crucial for individuals, businesses and policymakers to unite in addressing the challenges posed by digital feudalism.

AI algorithms are also susceptible to bias, including racial, gender and socio-economic biases.[2] These biases can stem from skewed training datasets that do not represent diverse populations or from algorithmic design flaws that perpetuate existing societal discrimination . AI developers such as OpenAI, conceal aspects of their operations, including the sources of their training data, the safeguards implemented in their models, the enforcement of their terms of service and the potential harms associated with their products such as addictive use and underage access. They obscure the extent to which their platforms are leveraged for global monetization through targeted advertising.

1. Ciklum, 'AI and Big Tech Transformation: What to Expect as Big Tech Doubles Down on AI', Ciklum, 2024
2. Zhao, Y., Li, M., & Chen, J., 'Artificial Intelligence in Healthcare: A Review of Applications, Challenges, and Future Directions', ScienceDirect, 2023


Photo Credit: Reuters

Tech billionaires including Elon Musk, Mark Zuckerberg and Jeff Bezos were given prime positions at Donald Trump's inauguration, in an unprecedented demonstration of their power and influence on US politics.

The Way Forward

AI can enhance our lives in many ways, from improving food production to bolstering resilience against natural disasters. But unless we address the nature of digital feudalism, the extractive behavior that underpins AI model development, and the current lack of regulatory capacity in the public sector, any attempt to unleash more robust, sustainable growth will crash on the rocks of new and deeper inequalities.

As we navigate the complexities of the digital age, it is crucial for individuals, businesses and policymakers to unite in addressing the challenges posed by digital feudalism. Advocating for stronger data protection laws that prioritize user privacy and autonomy is a vital first step. Supporting decentralized technologies is another critical avenue for reducing the concentration of power in the hands of a few tech giants. Promoting open standards and interoperability can help mitigate the lock-in effects of proprietary systems, giving users more freedom to choose the services that best meet their needs.

Also, key is the creation of independent digital infrastructure initiatives that includes cloud computing, advanced chips, AI and data, all governed as public goods rather than through monopolistic enterprises.

Public awareness and advocacy will be crucial for driving meaningful change. By staying informed about digital rights and the practices of Big Tech companies, individuals can make more conscious decisions about their digital lives, and make sure AI is safe and trustworthy and good for all humankind.

In this new digital feudal system, users generate value through their data but have little control over how it is used.

Accelerating Climate Action & Circular Economy

Embracing AI as a strategic enabler will allow Pakistan to unlock new pathways for growth and ensure a sustainable low-carbon future for generations to come.

By

Ehsan Gul

Co-Founder Green Box

Artificial Intelligence (AI) is rapidly redefining the sustainability landscape and emerging as a critical enabler of climate action. From optimizing energy systems to enhancing environmental monitoring, the potential of AI to accelerate progress towards net-zero goals is profound. For Pakistan, a nation increasingly vulnerable to climate risks, leveraging AI presents an opportunity to transform economic sectors while mitigating environmental damage.

Driving Climate Innovation with AI

AI capabilities in data processing, pattern recognition and predictive analysis allow it to address climate change across three key dimensions including mitigation, adaptation and foundational climate capabilities.

1. Mitigation through Emissions Reduction

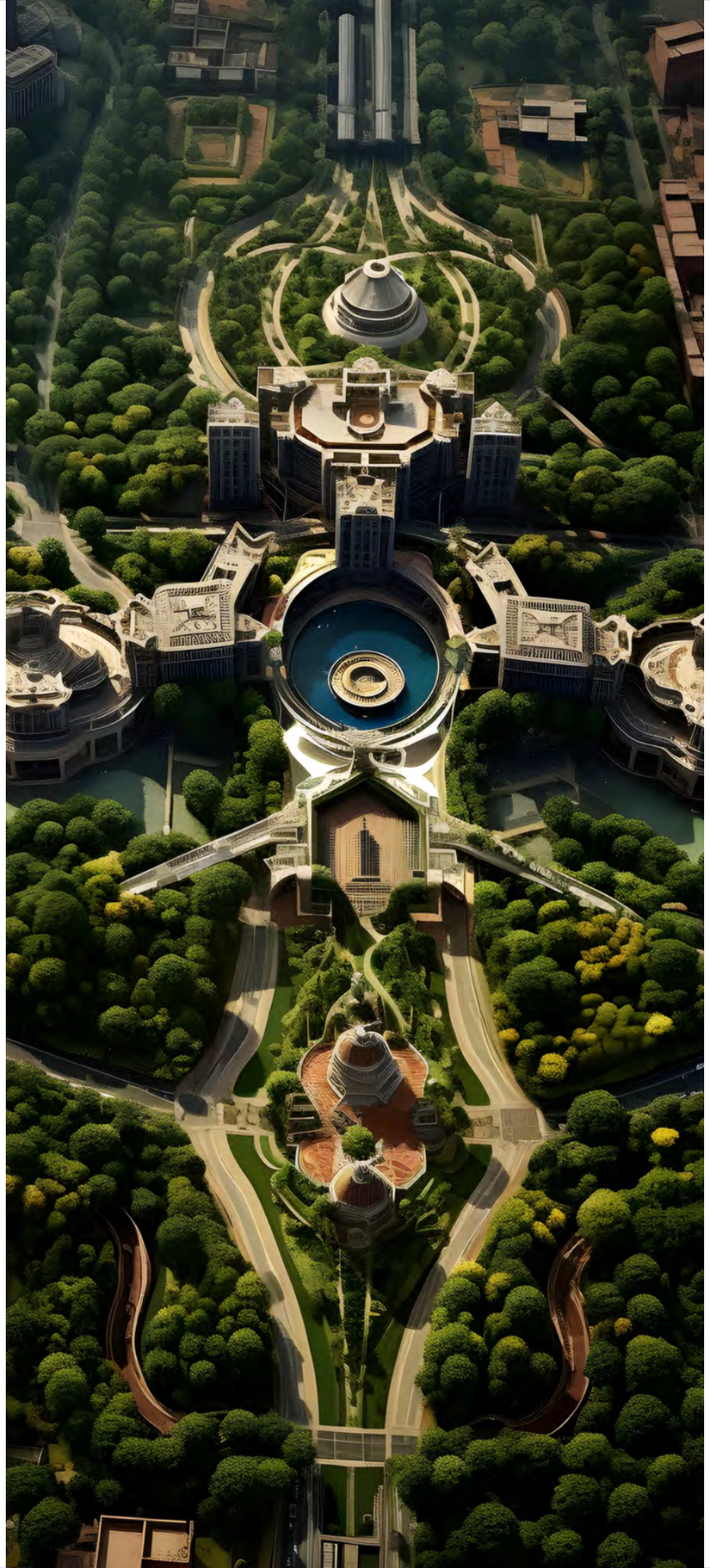
AI offers powerful tools to reduce Greenhouse Gas (GHG) emissions across sectors:

- **Energy Efficiency:** AI can optimize energy grids by predicting demand, integrating renewable energy and balancing supply with real-time insights. By improving load balancing, AI enables energy systems to reduce waste and boost resilience.
- **Industrial Optimization:** Predictive maintenance powered by AI can extend equipment lifespans, reduce material waste and improve production efficiency resulting in lower emissions.
- **Transport Decarbonization:** AI-driven route optimization and predictive maintenance can reduce fuel consumption in freight, public transport and logistics.

2. Adaptation and Resilience

As climate risks grow, Pakistan's vulnerability to extreme weather, water stress and food insecurity makes adaptation imperative. AI solutions can support the following areas below.

- **Early Warning Systems:** AI can forecast climate hazards such as floods, droughts, and extreme heat with precision, giving authorities time to mobilize responses.
- **Precision Agriculture:** AI solutions can analyze soil health, crop conditions, and weather data to help farmers optimize planting cycles, irrigation and pest control to improve yields and ensure food security.
- **Disaster Management:** AI mapping systems can identify at risk communities, coordinate resource deployment and improve post-disaster recovery efforts.



The cost of developing and scaling AI solutions is a key barrier for Pakistan. Public-private partnerships and targeted investment incentives are essential to support AI adoption in climate action.

3. Foundational Capabilities for Climate Science

AI enables faster, more accurate climate modeling and scientific discovery:

- **Climate Modeling:** Machine learning algorithms can simulate complex environmental systems, improving predictions on temperature patterns, droughts and sea-level rise.
- **Material Innovation:** AI-driven models accelerate the discovery of low-carbon materials for renewable energy, carbon capture and eco-friendly product design.

AI and the Circular Economy: Transforming Resource Use

A circular economy—one that minimizes waste and maximizes resource efficiency—relies heavily on data-driven insights. AI can enable Pakistan to strengthen circular practices through the following innovations:

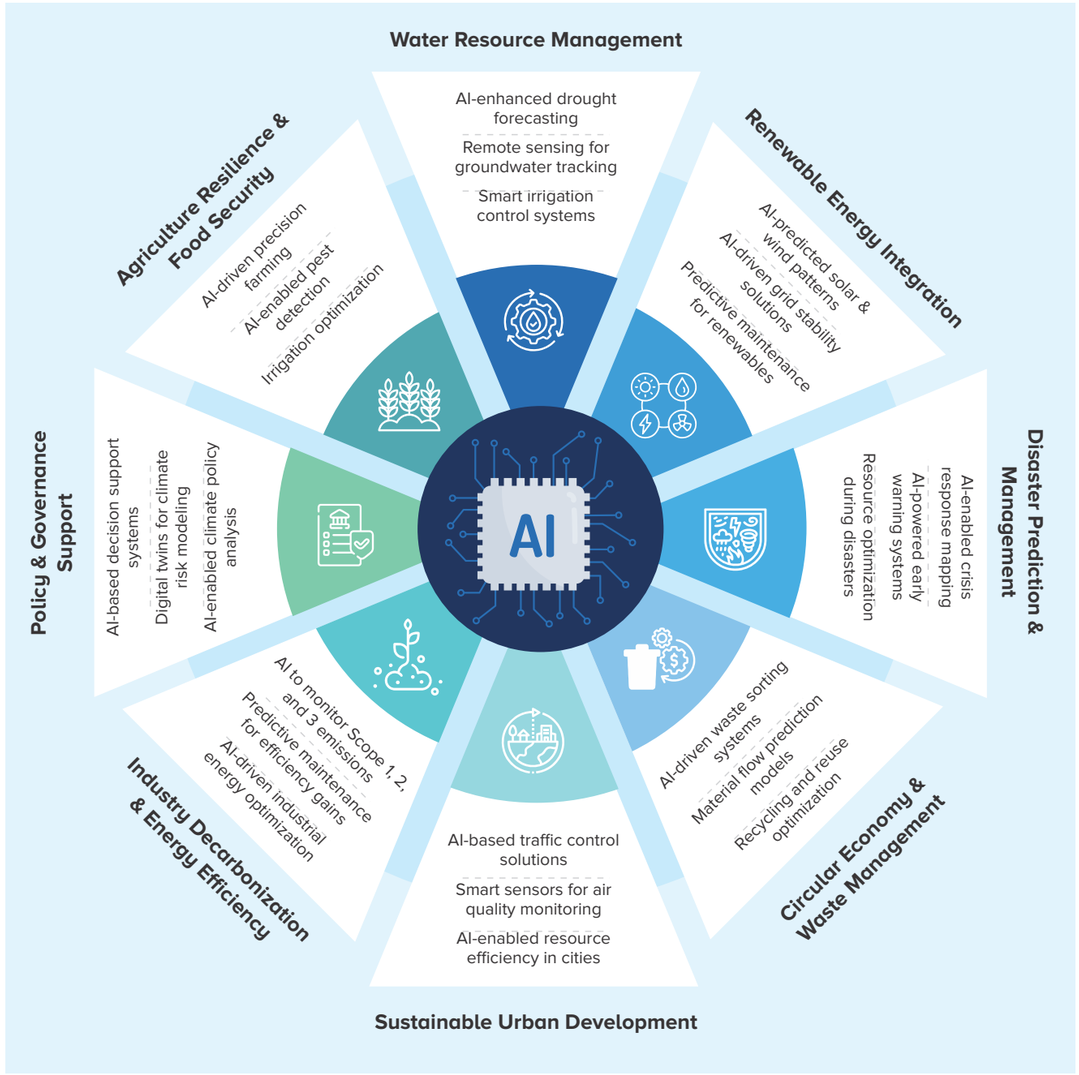
- **Smart Waste Management:** AI-based sorting systems can automate waste segregation, improving recycling rates and reducing landfill reliance.
- **Resource Optimization:** Predictive models can improve supply chain visibility, optimize inventory management and streamline reverse logistics to ensure material recovery and reuse.
- **Product Lifecycle Management:** AI-driven insights enable manufacturers to extend product life spans, reduce waste and enhance sustainability outcomes.

Pakistan's Challenges in Scaling AI for Climate Action

While the potential for AI adoption is clear, Pakistan faces several barriers that must be addressed to unlock its full potential:

- **Limited Data Infrastructure:** Pakistan lacks comprehensive environmental data systems which limits AI's effectiveness in climate modeling and prediction. Investing in climate sensors, data collection platforms and geospatial tools is critical.
- **Skills and Capacity Gaps:** AI deployment requires a technically skilled workforce. Pakistan must prioritize education, training and technical capacity-building to drive AI innovation in climate-focused sectors.
- **Financial Constraints:** The cost of developing and scaling AI solutions remains a key barrier. Public-private partnerships and targeted investment incentives are essential to support AI adoption in climate action.
- **Digital Divide:** Connectivity gaps in rural and underserved areas restrict access to AI-enabled solutions. Expanding broadband infrastructure and digital inclusion initiatives are crucial.

Machine learning algorithms can simulate complex environmental systems, improving predictions for temperature patterns, droughts and sea-level rise.



Solution Clusters for Pakistan's AI-Driven Climate Action

To effectively address climate challenges while unlocking economic opportunities, Pakistan can apply AI across eight key solution clusters, as shown in the diagram above. Each cluster presents strategic interventions that combine technology, data insights, and resource optimization to enhance resilience, improve efficiency and accelerate climate progress.

Conclusion: Embracing AI as Pakistan's Climate Catalyst

The convergence of AI, circular economy principles and climate action presents a powerful opportunity for Pakistan to mitigate risks and build resilience. Pakistan can position itself as a leader in climate-smart innovation by investing in AI infrastructure, fostering partnerships and cultivating talent. Embracing AI as a strategic enabler will allow Pakistan to unlock new pathways for growth while ensuring a sustainable, low-carbon future for generations to come.

AI-powered innovation can drive Pakistan's climate resilience, unlock economic opportunities and pave the way for a sustainable future.

The Future of Work in the Age of AI

Almost 61 percent of Pakistani workers have an education below matriculation and only 3.2 percent have technical or vocational training. AI-driven automation is set to impact low-skilled and blue-collar workers, especially those from lower-income backgrounds.

By

Umer Akhlaq Malik

Policy Analysist, UNDP Pakistan

Throughout history, technological revolutions have reshaped global employment trends, redefining the nature of work and workforce dynamics.

The first Industrial Revolution in the late 18th to early 19th century saw steam engines replace manual labor, displacing artisans with factory jobs. The second Industrial Revolution from the late 19th to early 20th century brought electricity and mass production, revolutionizing industries and rendering countless traditional skills obsolete. Fast forward to the Digital Revolution from the 1970s till the 2000s, when computers and automation transformed industries, drastically reducing the need for clerical and repetitive manual tasks while creating demand for new tech-driven skills. Jobs of typists, switchboard operators and traditional bookkeepers saw a sharp decline as digital systems took over data entry, communication and financial management. Manufacturing lines also became more automated, leading to job losses for assembly line workers while increasing the need for robotics maintenance and programming expertise.

Today, we stand at the dawn of the AI Revolution, where Artificial Intelligence (AI) is not just changing jobs but redefining them entirely. From predictive algorithms to generative AI, technology is augmenting human potential while raising pressing concerns about job displacement, workforce adaptation and the future of work. The true impact of this transformation will depend on how individuals adapt—whether they upskill to meet evolving demands or risk obsolescence in a rapidly changing job market.

The Impact of AI Automation on the Labor Market

The primary impact of AI will be on jobs involving repetitive manual tasks while professions dealing with complex information are likely to benefit. While short-term job losses are inevitable, AI is expected to drive long-term employment growth. Experts predict that AI and machine learning will create more jobs than they replace. According to the World Economic Forum, AI and technology could generate 170 million jobs by 2030 while displacing 92 million.[1]

1. World Economic Forum, Future of Jobs Report 2025, World Economic Forum, 2025, [online] Available at: https://reports.weforum.org/docs/WEF_Future_of_Jobs_Report_2025.pdf

Beyond employment shifts, AI has the potential to significantly boost economic growth. By 2030, it is projected to contribute an additional US$13 trillion to the global economy—equivalent to a 16 percent increase in cumulative GDP.[2]

However, the impact of AI on the labor market will not be equitable. Those with lower human capital will face greater challenges whereas higher-skilled workers will be better positioned to adapt and thrive.

The country's expanding IT market reflects Pakistan's growing efforts to integrate AI into its economy and workforce, offering a foundation for future progress despite its existing challenges.

Challenges

Pakistan's labor force faces significant challenges in adapting to AI-driven changes due to its low Human Capital Index (HCI) of 0.41, which is below the South Asian average and comparable to Sub-Saharan Africa. With expected years of schooling at just 9.4—and learning-adjusted schooling dropping to 5.1—educational attainment remains a major barrier.

Data from Pakistan's Labor Force Survey (LFS) 2020-21 provides insight into the country's low human capital base and its limited preparedness for

2. McKinsey & Company, 'Notes from the AI Frontier: Modeling the Impact of AI on the World Economy', McKinsey & Company, 2025, [online] Available at: https://www.mckinsey.org/featured-insights/artificial-intelligence/notes-from-the-ai-frontier-modeling-the-impact-of-ai-on-the-world-economy

AI-related jobs. A significant portion of the workforce at 37.4 percent is engaged in agriculture, a sector less likely to adopt AI. About 42 percent hold routine-based jobs such as clerical work, services, sales and machine operation. These jobs tend to be held by people with limited education and they face the highest risks of displacement as AI automates their functions.

There is a critical skills gap in Pakistan as 61.5 percent of workers have education below matriculation and only 3.2 percent have received technical or vocational training. AI-driven automation in Pakistan is set to disproportionately impact low-skilled and blue-collar workers, particularly those from lower-income backgrounds.

Women dominate the informal sector and they are especially vulnerable as AI threatens their roles in waste collection and manufacturing, risking their economic stability and widening gender inequality.

Limited internet access for 46 percent of the population is still a major issue. There is also a disconnect between education and industry demand that further hinders AI readiness. Pakistan risks falling behind in the AI-driven global economy without targeted reforms in education, digital literacy and vocational training.

Opportunities

There are promising signs of progress in Pakistan's transition towards an AI-driven future. Pakistan produces over 25,000 Information Technology graduates[3] with several universities now offering dedicated AI degree programs. Additionally, Pakistan's dynamic freelancing market has 2.37 million active freelancers who are generating $397.3 million in foreign remittances (Fiscal Year 2021-2022) and ranking third globally in growth.[4] The country's expanding IT market reflects Pakistan's growing efforts to integrate AI into its economy and workforce, offering a foundation for future progress despite the existing challenges.

Sectors reliant on manual, repetitive tasks such as manufacturing, retail and agriculture face significant disruption as robotics, self-checkouts, AI-driven inventory systems and automated farming technologies reduce the need for low-skilled labor. To mitigate job losses, Pakistan must prioritize reskilling and workforce adaptation.

Women dominate the informal sector, and they are especially vulnerable as AI threatens their roles.

AI also presents new opportunities in emerging industries. Demand for AI specialists, data scientists and machine learning engineers are rising as businesses adopt AI solutions. Robotics and automation engineering is also expanding skills which are in demand in manufacturing, healthcare and agriculture. IT and cybersecurity are also experiencing rapid growth. AI-driven advancements in renewable energy such as smart grids and energy automation are also opening new career paths.

The Path Forward

It is critical to make investments in AI and digital literacy, technical education and innovation. To prepare Pakistan's workforce for an AI-driven future, both the government and private sector must play proactive roles in education, training and innovation. The government must reform education by prioritizing Science, Technology, Engineering, Mathematics (STEM) subjects, expanding vocational training and integrating AI-focused courses into curricula. Investments in digital infrastructure such as high-speed internet and data centers will be crucial for AI adoption.

Policies should also encourage responsible AI use while supporting businesses through incentives for technology-driven job creation. Meanwhile, the private sector can drive innovation by investing in AI research, automation and workforce training. Companies should collaborate with universities to develop industry-aligned curricula, provide internships and support AI startups. By fostering public-private partnerships, Pakistan can mitigate job displacement, equip its workforce with future-ready skills and harness AI for economic growth.

Public-private partnerships are crucial to reducing job displacement and equipping Pakistan's workforce with future-ready skills.

As history shows, every disruption creates new possibilities. By embracing innovation and adapting to change, Pakistan can harness AI's potential for economic growth and workforce resilience.

3. Ministry of Information Technology and Telecommunication, Pakistan's IT Industry Report, Government of Pakistan, 2025, [online] Available at: https://moitt.gov.pk/SiteImage/Misc/files/Pakistan%27s%20IT%20Industry%20Report-Printer.pdf
4. Ignite, Final Report on Assessment of the Freelancing Ecosystem – DigiSkills.pk, Ignite, 2018, [online] Available at: https://ignite.org.pk/wp-content/uploads/2018/06/Final-Report-on-Assessment-of-the-Freelancing-Ecosystem-DigiSkills.pk_.pdf

Photo Credit: Muskaan Mujahid

Participants, speakers and organizers pose for a group photo at the 9th edition of Women Tech Quest, held at NASTP in Karachi on February 15, 2025.

Is Technology Making Us Lonelier?

Research indicates that increased screen time correlates with higher rates of anxiety, depression and loneliness among adolescents and young people.

By

Dr. Saima Majeed

Associate Professor, Department of Psychology, Forman Christian College University

In an era where digital connectivity is at its peak, one of the paradoxes of modern life is the growing sense of loneliness across all age groups. Technology has reshaped human interaction in unprecedented ways. AI-driven communication tools, social media platforms and instant messaging apps make it possible to stay connected all the time and across the globe. However, these digital interactions often lack the depth and emotional richness that one receives from in-person communication. Excessive reliance on technology can create a superficial sense of connection.

Hyperconnectivity and Social Disconnection

The advent of AI has revolutionized communication platforms. Instagram, TikTok and Snapchat are embedded in young people's social lives and have introduced new challenges. Research indicates that increased screen time correlates with higher rates of anxiety, depression and loneliness among adolescents and young adults.[1] There are questions about whether screen time and mental health are correlated, or if there is a cause-and-effect relationship between them? Is it those who are already socially isolated that will spend more time on social media? or is it the intense users that develop social isolation? These questions still need valid answers.

Due to social media platforms, individuals have a higher tendency to make social comparisons that leads to social exclusion and feelings of inadequacy. Social media portrays an ideal version of life which isolates people from the realities. Users for impression management present edited versions of photos, selective achievements that fail to present actual life struggles and failures that distort the true perception of reality. It can create a sense of low self-esteem in those who consider that people are leading their ideal life full of happiness, success and love. Such social comparison leads to dissonance between their actual and ideal life that gives way to loneliness, social disconnection and inadequacy. Over time, such social comparison leads to isolation and social anxiety that makes people frightened to have in-person connections.

1. Riehm, K. E., et al, 'Associations Between Time Spent Using Social Media and Internalizing and Externalizing Problems Among US Youth', JAMA psychiatry, 76(12), 2019, 1266–1273. Available at: https://doi.org/10.1001/jamapsychiatry.2019.2325

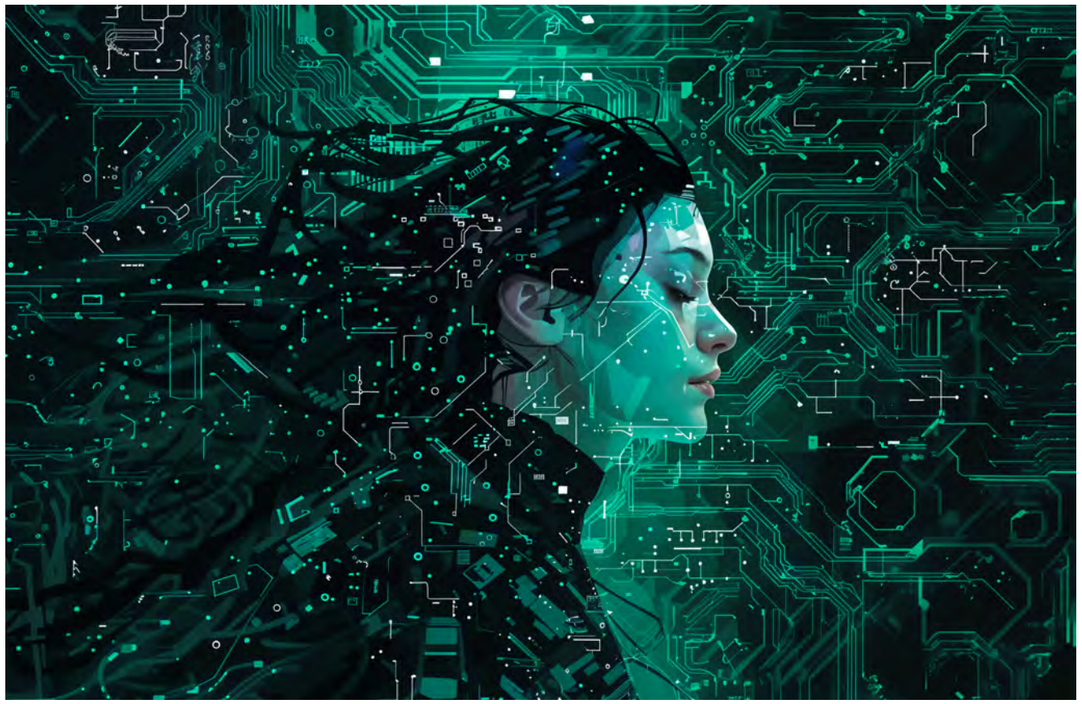
AI-driven social interactions, such as chatbots and virtual influencers, further complicate the landscape. AI can provide companionship, but it lacks the emotional depth of human relationships. Instead of spending time having real-world connections, some young people rapidly develop attachments to virtual friends, reinforcing isolation rather than alleviating it.

AI-based solutions such as robotic caregivers and virtual assistants have been introduced to reduce loneliness among senior citizens by providing companionship. Nevertheless, they do not substitute human interaction.

Digital Divide and Emotional Isolation

The digital divide is a challenge that is faced by elderly people as well. Many older adults struggle to adapt to the rapid change of technology and this has created a sense of exclusion from digital social spaces. With families becoming more dispersed, traditional support networks have weakened and many elderly individuals rely on digital tools to stay in touch. However, difficulty in navigating these tools can leave them feeling more disconnected rather than included.

Ironically, AI-based solutions such as robotic caregivers and virtual assistants have been introduced to mitigate loneliness among the elderly. While these innovations provide some level of companionship, they cannot replace human interaction. Studies suggest that older adults who rely on digital communication rather than face-to-face interactions experience higher levels of loneliness and depressive symptoms.[2]



The Mental Health Consequences of Technology-Induced Loneliness

Loneliness has profound effects on mental health across all age groups. Chronic loneliness has been linked to increased risks of depression, anxiety and even physical health issues such as cardiovascular diseases. Among young people, the pressures of digital validation can exacerbate mental health struggles. For the elderly, a lack of social interaction can lead to cognitive decline and emotional distress.

AI-driven personalization in social media and online content gives rise to echo chambers that reinforce the already existing belief system. Inclusivity and diversity may be challenging to achieve in this manner, as it may limit diverse social interactions and exposure to different perspectives, thus reducing opportunities for meaningful social engagement.

Ethical and responsible use of AI can lead to positive social outcomes. For example, chatbots can be used for mental health services and virtual reality can be used to build connections to bring people together. If used mindfully, technology could be used to foster genuine connections. Digital literacy programs for young and older adults can also help mitigate the negative impacts of AI and social media. These programs can bridge the digital divide for older adults by enabling them to stay connected with family and friends. For young people, digital literacy programs can promote healthy digital habits such as taking breaks from social media, being mindful of digital content, engaging prioritizing in-person activities and cultivating offline friendships. All these activities can reduce excessive screen time and enhance real-world engagement.

Digital literacy programs for young and older adults can help mitigate the negative impacts of AI and social media.

2. Balki, E., Hayes, N., & Holland, C. (2022). The Impact of Social Isolation, Loneliness, and Technology Use During the COVID-19 Pandemic on Health-Related Quality of Life: Observational Cross-sectional Study. Journal of medical Internet research, 24(10), e41536. https://doi.org/10.2196/41536.

AI Early Warning Systems:

Tipping Point for Better Climate Adaption

The potential of early warning systems applying AI can be revolutionary as they can generate glacial lake outburst floods simulations and future-based scenarios with greater precision.

By

Malaika Orakzai

Reporting & Content Development Coordinator, UNDP Pakistan

The sound of rushing water can be a death knell in the remote valleys of Northen Pakistan. With over 10,000 glaciers rapidly receding, the threat of sudden, devastating floods looms over millions. But what if technology could warn us before disaster strikes?

Amid Climate change, 10,000 glaciers in Pakistan's North, out of 13,032 glaciers, are receding at alarming rates, resulting in catastrophic Glacial Lake Outburst Floods, known as GLOFs.[1] These outburst floods can devastate communities, displacing households, destroying infrastructure and threatening livelihoods, while putting approximately 7.1 million people at risk.[2] As these climate-induced disasters become more unpredictable, Artificial Intelligence (AI) is emerging as a powerful tool to predict and manage catastrophic disasters such as GLOFs.

To advance the functionality of Early Warning Systems (EWS), AI's scope can be revolutionary in generating GLOF simulations and future-based scenarios for advanced climate adaptation. Countries such as Nepal and Switzerland have tapped into AI-powered early warning models to predict and mitigate GLOFs, incubating pathways for countries like Pakistan to integrate AI-driven simulations and multilingual alert systems for better disaster preparedness.

The UNDP GLOF-II project, a joint initiative with the Ministry of Climate Change and Environmental Coordination, supported by the Green Climate Fund has undertaken the installation of 192 EWS in the 24 most climate vulnerable valleys of Gilgit Baltistan and Khyber Pakhtunkhwa. These high-tech systems, installed in collaboration with the Pakistan Meteorological Department generate data based on any weather changes sensed, prompting timely evacuation alerts for communities. With over 421,232 people now under its protective reach, these systems are detecting threats and saving lives.

"If the water depth exceeds the predefined threshold, the system immediately transmits data with a warning to the intended server. The warning helps trigger an alarm for timely evacuation before disaster strikes a valley."

Faisal Jahanzeb, Mechanical Engineer, GLOF-II

The EWS consists of advanced Automatic Weather Stations, rain gauges, water depth gauges, data loggers and warning posts designed to monitor and detect climate-induced hazards. The EWS generates real-time data that is transmitted through satellite and GSM networks to the primary server in Islamabad. These systems capture data after every ten minutes for rainfall, irradiance, wind direction, snowfall, water level and discharge.

With the use of AI, the predictive capabilities of the systems can be exponentially enhanced, mapping out climate trends, early detection of risks and data-driven decision-making in the region. It can identify which valleys are most likely to be affected if a GLOF hits speedy alert transmissions in multiple languages. AI-powered approach can also simulate different emergency scenarios which can provide insights for better safety plans for communities. It can strengthen climate resilience by providing authorities with significant insights to protect vulnerable communities from escalating climate catastrophes.

AI is an evolving field and comes with risks such as data inaccuracy, which can trigger false alarms or disparities in internet access and network issues that might compromise system's effectiveness. To mitigate these risks, hybrid models combining AI predictions with human verification can enhance reliability. Investing in local internet infrastructure can ensure uninterrupted communication of warnings, making the system more robust.

Community engagement is at the heart of disaster precaution. The GLOF-II project has helped communities in the targeted valleys with trainings including mock drills and awareness sessions to respond to warnings, evacuate promptly and to seek refuge in the project's safe havens and Community-Based Disaster Risk Management centres. The installation of EWS make communities feel more protected.

By integrating AI with EWS and community-driven approaches, Pakistan can set a blueprint for effective disaster preparedness—one where livelihoods are safeguarded before disaster strikes. AI's challenges can be addressed, unlocking its full potential, paving the the way for a future where technology, innovation and community resilience converge—building stronger, resilient and sustainable shield against climate change threats.

"Before the installation of the early warning systems we lived in constant fear, never knowing when a glacial lake outburst flood might strike. Now, with the alarm to warn us, we have the chance to evacuate in time and reach safety."

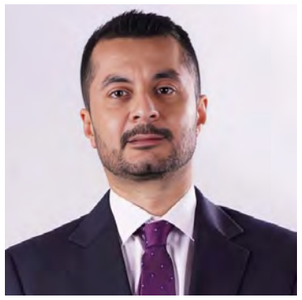
Sitara, a member of Ghulkin Community-Based Disaster Risk Management

1. The New Inventory of 13,032 glaciers in Pakistan: The Glaciers & Students Project, Ministry of Foreign Affairs and International Cooperation and Italian Agency for Development Cooperation (AICS) & United Nations Development Programme, 2024
2. Ministry of Climate Change and Environmental Coordination

Jazz Has a FikrFree Plan:

AI-Powered Health & Financial Wellbeing

Jazz launched FikrFree, an AI-powered platform in October 2024, designed to revolutionize healthcare and insurance services. Within just four months, FikrFree sold over 1.5 million policies.



By

Kazim Mujtaba

President, Consumer Division, Jazz

Our Vision

Our mission at Jazz is to empower lives and livelihoods through the transformative power of technology. With our DO 1440 strategy, we are committed to serving our customers every minute of the day, delivering innovative digital solutions that address their diverse needs. As Pakistan's largest digital operator, we have already evolved into a purposeful ServiceCo, expanding our offerings beyond traditional connectivity to include a wide range of digital services that include health, fintech, lifestyle and more. This evolution is designed not only to enhance the lives of over 100 million customers, but also to bridge the digital divide, making technology more inclusive and accessible. By democratizing digital access, we are ensuring that essential services reach all communities, particularly underserved areas so that they thrive in the digital age.

Introduction to FikrFree

Millions of people in Pakistan, and especially women from rural areas, face significant barriers in accessing affordable healthcare and insurance. Limited mobility, cultural barriers and economic constraints exacerbate this issue, leaving many without adequate services. To address these challenges, Jazz launched FikrFree, an AI-powered platform, in October 2024. FikrFree is designed to revolutionize healthcare and insurance services. The platform offers personalized solutions that cater to the unique needs of underserved communities, with a strong focus on women, although other products such as crop and bike insurance are also part of the portfolio. Within just four months, FikrFree sold over 1.5 million policies, this demonstrates its significant impact on the lives of marginalized communities.

Overview of FikrFree

FikrFree is a comprehensive digital platform offering essential healthcare and insurance services powered by AI. These services include online consultations with doctors, medicine delivery, and personalized insurance recommendations. The AI system tailors these offerings to each user based on their demographics, behavior, location and device type, ensuring that services are relevant and accessible.

Key features include:

- **Online Consultations:** Available 24/7, users can access over 400 doctors specializing in more than 30 medical fields, including gynaecology, urology and other critical areas.
- **Medicine Delivery:** FikrFree offers home delivery in over 50 cities for essential medications, simplifying access to prescribed medicines without the need to visit pharmacies.
- **Personalized Insurance:** AI-driven insights provide personalized insurance recommendations, aligning coverage with individual user profiles.

Two hundred and fifty of the 400 doctors on the platform are female, allowing women to consult with female healthcare professionals.

These services work together to provide accessible, affordable and a comprehensive healthcare and insurance experience, especially for those with limited access to traditional service models.

Promoting Gender Diversity, Equity and Inclusion

FikrFree prioritizes gender equity, diversity and inclusion in its services. In regions where cultural barriers limit women's access to healthcare, FikrFree offers significant support. Over 250 of the 400 doctors on the platform are female, allowing women to consult with female healthcare professionals, a critical feature in conservative areas. This initiative increases accessibility and empowers women by providing healthcare options from the comfort of their homes.

Additionally, FikrFree offers healthcare services from a diverse range of doctors, respecting cultural and ethnic differences, ensuring that users from all backgrounds receive culturally appropriate care, fostering trust and acceptance in underserved communities.

Impact on Pakistan's Digital Health Ecosystem

FikrFree is reshaping Pakistan's digital health ecosystem by leveraging the growing penetration of smartphones and digital adoption. By integrating healthcare and insurance services, the platform offers a seamless experience to users. FikrFree amplifies its reach and effectiveness through collaborations with insurance companies, healthcare providers and fintech platforms. The platform's flexibility in payment options ensures financial constraints do not hinder access to essential services. JazzCash, debit/credit cards and cash-on-delivery are the range of options available that enhances the platform's accessibility for users across different socio-economic backgrounds.

The Role of AI in Sustainability and Social Impact

FikrFree is actively contributing to several SDGs, particularly SDG 3 (Good Health and Well-Being), SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities). By improving healthcare access and offering personalized insurance, the platform helps reduce disparities in healthcare and financial security, especially for low-income and marginalized groups.

AI plays a pivotal role by ensuring the platform remains responsive to the specific needs of underserved populations. Through tailored recommendations and flexible payment options, FikrFree ensures healthcare services are not just accessible but also relevant and sustainable for diverse communities.

Scalability and Long-term Vision

Looking ahead, FikrFree is poised for substantial growth. The platform's scalability is enhanced by advanced AI policy recommendations that continually improve the precision and relevance of healthcare and insurance offerings. In the future, FikrFree plans to expand to offer macro policies with higher coverages, addressing the diverse needs of a broader population. It aims to introduce over 50 insurance categories, covering a wider array of products to cater to a diverse customer base across Pakistan.

The long-term vision includes increasing the platform's footprint in both urban and rural areas, scaling up its partnerships with insurance providers and healthcare networks and using AI to continuously refine its services. Ultimately, our goal is to make FikreFree a key player in Pakistan's digital health and insurance sectors, setting new benchmarks for accessibility and inclusivity.

Conclusion

FikrFree is a transformative force in Pakistan's healthcare and insurance industries. By combining AI technology with personalized services, it is improving access to healthcare and financial security for millions, particularly those in marginalized communities. Its focus on gender equity, inclusivity and sustainability makes FikrFree a leader in Pakistan's digital health ecosystem. With plans for further expansion and a strong long-term vision, FikrFree is poised to continue transforming lives by offering solutions that are simple, affordable and tailored to the unique needs of its customers.

Case Study

© UNDP Pakistan

UNDP Tech Tales:

Women, Technology & Business

Technology has helped women entrepreneurs to successfully build their businesses in overcrowded market spaces.

By

Waleed Yawer

Program Officer,
CODE PAKISTAN

Code Pakistan has partnered with UNDP Pakistan to disseminate key findings from the National Human Development Report (NHDR), 'Doing Digital for Development', released last year in 2024. As part of the NHDR dissemination sessions, a plenary event called, 'Tech Tales', has grown from an agenda item to a celebration of Pakistani women in technology and business. This event promises greater digital and financial inclusion for Pakistani women. The women who have joined Tech Tales are using digital tools and platforms to create and grow their businesses.

They have kept their business model and proposition simple. Below are key components from their business plans:

- Developing and improving skills is key.
- Understanding the gap in the relevant industry or market.
- Conducting an aggregated market analysis to assess demand for the product or service. The women entrepreneurs took different approaches at this stage.

Women Tech Entrepreneurs' Stories

- Maria Riaz is a digital illustrator and founder of WHY Books from Muzaffarabad. She developed her skills and business to improve her services and products. She built demand for local children's role models such as Mr. Abdul Sattar Edhi and disseminated her products through digital illustrations.
- Sana Razzaq, founder of KN Himalayan Pink Salt, has carved out her niche within the growing market for pink salts. She has introduced bath salts for cosmetic routines that has driven demand for her products.
- Zareen Taj, founder of Shaheen Zaman Wedding and Jewellery Designer, and Sheher Bano founder of SH Jewellery and Cosmetics, came into a saturated market in the business and consumer hubs of Karachi and Lahore, respectively. They created value propositions that eventually helped them excel.
- Mahrose Zufran, a 16-year-old student from Karachi, created a Sindhi language calculator using AI for the local Sindhi speaking business owners in her area.
- Tuba Majeed is the founder of Tuba's Photography from Azad Jammu & Kashmir, she offers her services nation-wide. Tuba is the first female professional photographer from AJK.

Amazon has helped Maria expand her business to international markets and reduce printing costs.

Despite varying approaches to business growth, all the entrepreneurs relied on technology and digital platforms at different stages. The businesses entered competitive markets, but technology assisted them in understanding target audiences, aligning demand and marketing their products and services.

Scalability

The goal of each entrepreneur is business expansion. Maria Riaz and Sana Razzaq have reached international markets, this achievement was possible only through understanding the global supply chains and especially by creating a seller-buyer network through digital platforms. Maria found that Amazon had helped her expand her product to international markets and reducing at source printing costs. Kashish Sami, founder of Khyber Special Pakwan and Aneeta Khan, owner of a salon in Peshawar, run resource heavy businesses and plan to expand their services nationally.

To meet their expansion targets, their best bet as entrepreneurs is AI. For each of these businesses, retaining their consumer base nationally and globally is key. The use of AI can help in identifying consumer patterns, understanding consumer behavior and customizing business approaches aimed at expansion for each business. All the Tech Tales women entrepreneurs have done a remarkable job creating and sustaining business services with odds stacked against them. The use of AI will only help their businesses grow and flourish.

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