Writer’s Bio

Humaira Rana is the General Manager of Operations at Crop2X and has led the GSMA Innovation Fund project focused on climate resilience and adaptation. She works at the intersection of artificial intelligence, IoT, and digital agriculture in Pakistan, focusing on building and scaling applied AI solutions for emerging markets where real-world constraints such as limited data, infrastructure gaps, and field-level usability shape technology design and deployment.

Her work centers on translating AI into practical, context-aware systems that improve agricultural productivity, climate resilience, and decision-making in underserved regions. She holds a Bachelor’s in Electronics Engineering and a Master’s in Data Science, combining strong engineering foundations with advanced expertise in data-driven intelligence to design and deliver impactful, real-world AI solutions.

Women, AI, and Agriculture in Pakistan: Rethinking Innovation Beyond Silicon Valley

Beyond Silicon Valley: Where Real AI Is Being Built

Artificial Intelligence is often associated with major technology hubs, billion-dollar companies, and advanced research labs. Yet some of the most meaningful applications of AI are emerging far beyond Silicon Valley, in regions where technology is being built not for convenience, but for necessity, resilience, and survival.

My Journey Into AI and Applied Systems

My journey into AI did not begin in a global tech capital. It began through a background in Electronics Engineering and later expanded into Data Science, where I became increasingly interested in how intelligent systems could solve real-world problems across developing and underserved communities. I was not initially drawn to AI because of trends or hype, but because I kept noticing a gap between what technology promised and what was actually usable in real environments.

Over time, this curiosity evolved into hands-on work at the intersection of AI, IoT, and applied digital systems across domains, including agriculture. Working in these areas shifted my understanding of AI from something theoretical into something deeply practical, where models are only as valuable as their ability to function in messy, unpredictable conditions.

Agriculture as a Real-World Test of AI

One of the most powerful examples of this is agriculture.

In agriculture-driven economies, AI and IoT systems are increasingly being used to monitor environmental conditions, analyze soil and crop health, optimize water usage, and support farmers in making timely, data-informed decisions. These systems are not replacing human expertise — they are augmenting it, helping communities navigate climate variability, resource scarcity, and productivity challenges.

At Crop2X, I have seen how, in practice, the success of such systems has little to do with how sophisticated the model is. What matters is whether the output is meaningful for the person using it in the field — someone dealing with weather uncertainty, time pressure, and limited resources. That realization changed how I think about AI entirely.

The Reality of Data Scarcity in Emerging Markets

One of the biggest challenges in agriculture and in many emerging markets is the lack of structured and reliable data. In many cases, historical records are incomplete, sensor coverage is limited, and environmental conditions vary too widely to create clean, standardized datasets.

This raises a fundamental question: how can AI be trained when the very data it depends on is not readily available?

In practice, this challenge reshapes how AI is built. Instead of relying on large, perfect datasets, systems often emerge through a combination of approaches — including transfer learning, small but high-quality local datasets, synthetic data generation, and continuous learning from real field feedback.

In agriculture, this may mean starting with limited soil, weather, or crop data and improving systems iteratively through deployment. It also means that domain expertise from farmers, agronomists, and field operators becomes just as important as the data itself.

In many ways, data scarcity does not stop AI development; it redefines it. It forces systems to become more adaptive, more context-aware, and more grounded in real-world validation rather than idealized conditions.

Trust: The Real Challenge in AI

Trust in AI is not built through complexity. It is built through reliability, transparency, and relevance to real-world conditions. Farmers, operators, and field users do not adopt technology because it is advanced — they adopt it when it consistently works, is understandable, and solves problems they actually face.

This is where the global AI conversation often becomes incomplete. While much of the world focuses on large-scale models, automation, and future disruption, many innovators in emerging markets are dealing with more immediate challenges: fragmented datasets, unreliable connectivity, affordability constraints, multilingual environments, and systems that must operate outside ideal conditions.

Why Context Matters in AI Development

Trust becomes the central question of the AI era.

People do not trust AI systems simply because they are intelligent. They trust systems that understand their environments, reflect their realities, and are built with their context in mind. This is why diversity in AI development is not optional — it is foundational. It is not only about gender diversity, but also about geographic, economic, and experiential diversity in how systems are designed and deployed.

When AI is designed primarily within a narrow set of global contexts, it risks overlooking the realities of emerging economies. Data gaps, environmental differences, and unequal digital access can unintentionally exclude millions of people from the benefits of technological progress.

Women Shaping AI Across Asia-Pacific

Women across the Asia-Pacific are already helping bridge this gap.

Today, women are contributing to AI not only through policy or advocacy, but through engineering, deployment, operations, cybersecurity, agriculture technology, healthcare systems, analytics, and digital infrastructure. Many are building solutions that directly influence how communities access services, safety, productivity tools, and economic opportunity.

Their contributions are especially important because trustworthy AI cannot be separated from inclusive AI. The systems we build reflect the perspectives of those who design them — and when women are actively involved in building and deploying AI, the scope of innovation becomes more grounded, more practical, and more aligned with real-world needs.

Responsible Innovation in Real Environments

As someone working in this space, I have come to believe that responsible innovation requires more than technical capability. It requires contextual awareness, human-centered design, and a commitment to building systems that function in real environments, not just ideal ones. It also requires the humility to continuously learn from how technology behaves once it moves from design to deployment.

Across emerging markets, women are already leading this shift. They are building startups, deploying AI-driven systems, managing technical operations, conducting applied research, and translating complex technologies into real-world impact across sectors like agriculture, infrastructure, and digital services.

The Future of AI Beyond One Geography

The future of AI will not be defined by a single region, company, or perspective. It will be shaped by the people building solutions in diverse environments across the world — including women leading innovation in agriculture, climate resilience, digital transformation, and beyond Silicon Valley ecosystems.

As AI becomes increasingly embedded into critical systems and everyday life, the question is no longer whether women belong in the future of technology. The real question is whether the future of AI can be trusted without their leadership in designing, building, and governing it.