IRADA
Indigenous Research and Development Agency

HALF YEARLY REPORT 2026

HALF YEARLY

JANUARY - JUNE

Executive Summary

Scientific and Technological Corporation of Pakistan STEDEC under MoST was established in 1987 with a seed money of Rs 20 million for commercialization but could not deliver desired outcomes. It has now been restructured into Indigenous Research and Development Agency IRADA and registered as Public Sector Company under SOEs Act and Policy 2023 with Head Office in Islamabad and regional offices in Lahore and Karachi.

It is mandated to drive innovation and economic development while focusing on commercializing research and development outcomes, bridging the gap between academia, industry, and policy. All operations of the company are managed by the executive management team which will soon be under the oversight and strategic guidance of the Board of Directors, recently notified by the Federal Government.

To transform the agency into a hub of technological innovation, the strategic framework has been crafted while the implementation strategy rests on key pillars of localization, integration, collaboration, capacity building and supportive policies. Major investment worth Rs 550 million has been made to revamp and transform the existing structure into a modern, purpose-built national innovation facility. A five-story, state-of-the-art complex with an integrated auditorium, has been successfully developed, designed to accommodate a workforce of 355 personnel, with 52 hi-tech HR already hired in niche domains. Major policies like HR, Finance and Procurement etc. have been formulated and enforced to achieve operational velocity and efficiency.

Key verticals have been identified and developed including Semiconductor Chip Design, Internet of Things, Software, Operating System, AI, AR/VR, Gaming, Cyber Security, Data Analytics, Printed Circuit Board and Surface Mount Technology and Mobile Assembly/Manufacturing. Three year operational and technological roadmaps have been formulated along with KPIs in consultation with National and International Industry Experts for product development and localization of technologies. All verticals are being staffed with highly qualified HR in a phased manner to become a lean, smart, innovative and self-sustainable organization.

The Semiconductor Chip Design Centre, planned to be one of the largest in the country, has started working on critical ICs (Digital and Mixed Signal) for a first tape-out targeted in June 2027, expanding into FPGA design and eventually focussing on power

management ICs and international design services. Relocation and recommissioning of state-of-the-art PCB and SMT machines is being carried out for initial prototype designing and fabrication, while preparing the facility for IPC/ISO certification for prototyping of R&D for advance electronics manufacturing. IoT and embedded systems vertical has initiated R&D on emerging demand in agriculture, energy and industrial domain. In SW, hardened mobile OS is in the final stages of evaluation and quality checks. Teams are being configured to develop indigenous AI platforms, AR/VR apps and games to deliver reliable diversified digital products and services.

An indigenously assembled rugged state-of-the-art smart phone and a customized hardened OS for selective customers while smart phones with full features for commercial users will be in the offing soon. It will eventually lead to indigenous development of mobile phones and smart devices (both hardware and software) in line with government policies to target international markets for exports by 2029. In agri-tech, the existing list of R&D products is being diversified in terms of quality, classification, scale and exploring varied markets for sustainable business. Special efforts are also in hand to commercialize the relevant technological potential within the country, where either the product exists or is in the final stages of development.

A number of strategic engagements and partnerships have also been undertaken to establish IRADA's footprint and engage with industry leaders and tech experts. Along with meetings with relevant stakeholders to explore mutual collaboration avenues, significant initiatives include delivering a keynote address in the Pakistan Semiconductor Summit at LUMS, awareness lecture at FAST- NUCES, conducting Health Systems Global Hackathon in collaboration with Harvard University and Pakistan's 1st UNConference'26 in partnership with Paklaunch, and the creation of 'Wafa-e-Arz,' a dedicated WhatsApp group for engaging the top tech Pakistani diaspora to drive the technology ecosystem in Pakistan.

Table of Contents

1. **Foundation and Transformational Setup** **1-2**
   a. Evolution
   b. Transformation
   c. Board of Directors
2. **Strategic Framework** **3-5**
   a. Vision
   b. Mission
   c. Objectives
   d. Implementation Strategy
   e. Infrastructural Development
   f. Governing Policies
3. **Strategic Domains and Progress** **6-12**
   a. Key Verticals
   b. Operational and Technological Roadmap
   c. Domain Wise Progress
   d. Human Resources
4. **Strategic Collaborations and Partnerships** **13-16**
   a. Industry
   b. Academic Institutions
   c. Government
   d. Events and Summits
   e. Marketing
5. **Conclusion** **17**

Foundational and Transformational Setup

1. Evolution

Scientific and Technological Development Corporation of Pakistan STEDEC was established in 1987 with seed money of **Rs. 20 Mn** as a subsidiary of PCSIR with Head Office in Lahore and Regional Office in Karachi, mandated to commercialize the products of PCSIR. It was registered as a shareholder company with **99.9% shares** of MoST and paid-up capital of **Rs. 72.4 Mn** (till date). STEDEC became an autonomous public sector company in 1997 directly under MoST with its mandate expanded to cover all MoST R&D organizations for commercialization, but unfortunately failed to deliver the dividends.

2. Transformation

STEDEC was transformed into IRADA with an aim to connect the fragmented S&T ecosystem, and declared an **"Essential SOE"** in July 24 to be operationalized and restructured under the SOE Act and Policy 2023. With a mandate to drive innovation and economic development, the organization focuses on commercializing research and development outcomes, bridging the gap between academia, industry, and policy.

By aligning scientific potential with industrial needs and through international collaborations, IRADA plays a key role in developing and promoting indigenous technologies, reducing import reliance, and supporting national self-sufficiency through innovation. It also endeavors to create Technology Intelligence to exploit emerging opportunities for competitive advantage and shape Pakistan's future in line with the ever-changing global dynamics.

To pursue the mandate, all operations of the company are managed by the executive management team comprising the MD, CTO, Directors and Project Directors which will function under the oversight and strategic guidance of the Board of Directors, as notified by the Federal Government.

3. **Board of Directors**. It has been formulated in line with the guidelines provided in the SOE Act and Policy 2023, and is composed of 7 members, with two Ex-Officio Directors (to be nominated by MoST and MoF, not below BS-20 and BS-21 respectively) and Five Independent Directors, with the Chairman of the Board appointed by the Federal Government.

Independent Directors

Fawad Ahmad Mukhtar - **CEO Fatima Group**

Ms. Misbah Naqvi - **Co-Founder i2i Ventures**

Mr. Athar Imran Nawaz - **Advisor to Chairman Lakson Group**

Dr. Syed Sohail Hussain Naqvi - **Chairperson Knowledge Streams**

Ms. Naureen Hayat - **CEO Zood Pakistan**

Strategic Framework

5. **Vision**. Transform into a national hub of technological innovation, spearheading the country's journey toward economic and technological sovereignty ensuring national security.

6. **Mission**. Enable a comprehensive S&T ecosystem synergizing applied research, industrial expertise, and governmental policy, by providing/supporting sustainable, scalable, and innovative solutions, achieving self-reliance and global competitiveness for exports.

7. **Objectives**

   a. To become a National Innovation Hub for sophisticated technologies.

   b. To enhance synergy and collaboration across academia, industry, R&D centers and defense to identify key requirements and unlock emerging potential for mutual benefit.

   c. To establish foreign linkages/collaborations to catalyze indigenous innovation.

   d. To create and maintain a national R&D Fund to support demand-based R&D activities.

   e. To indigenize technologies/products for import substitution towards sustainable economic growth.

   f. To facilitate commercialization of indigenously developed products/processes and technologies.

   g. To foster the development of intelligent solutions to real-world challenges to address technological deficiencies.

   h. To identify and support aspiring entrepreneurs / start-ups to enhance local industrial prowess.

   i. To assist in building skilled HR in line with future industrial requirements.

   j. To provide input for policy intervention to facilitate local manufacturing & export enhancement.

k. To utilize accredited laboratories for standards and quality testing, and provide input to evolve according to industrial requirements.

8. **Implementation Strategy**. There are five pillars of implementation strategy; localization, integration, collaboration, capacity building and supportive policies with details as under: -

a. **Localization**

(1) Develop technology roadmaps of all verticals to launch indigenous products starting from simplicity to complexity.

(2) Dedicate a specific fund as percentage of integral revenue, devising competitive grant schemes and developing public–private co-funding partnerships to support local technologies.

(3) Connect local startups/entrepreneurs with industry to deliver demand/market driven products.

b. **Integration**

(1) Create technology intelligence with national database of innovators, technologies and market for competitive advantage.

(2) Initiate joint R&D programs impacting industry and defense by capitalizing talent of academia and government institutions.

(3) Connect local technology companies and innovators with industry through targeted matchmaking while harnessing the potential of technology parks, incubators and ORICs etc. to deliver market driven products.

c. **Collaboration**. Collaborate with diaspora and foreign technology companies to execute JVs and projects for innovative products development.

d. **Capacity Building**

(1) Devise competitive grant schemes and developing public–private co-funding partnerships to support startups/ entrepreneurs.

(2) Offer certified trainings & capacity building workshops, masterclasses by domain experts and skill development through industry immersion programs and partnerships.

e. **Policy**. Facilitate policy studies & dialogues on regulatory gaps and create digital awareness campaigns on policy changes impacting technology.

IRADA Head Office main building envelop

9. **Infrastructure Development**. The Head Office building was acquired from the federal government in sector H-9 Islamabad, with a covered space of 50,000 Sq ft, facility spread across 5.5 Acre land. The existing structure with an investment worth Rs 550 million has been transformed into a modern, purpose-built facility within an exceptionally compressed timeline of nine months including building envelope, lawns, parking and an auditorium built for events conferences and seminars. It can accommodate a highly qualified human resource of almost 355 persons to serve as a multidisciplinary technology hub, housing dedicated Semiconductor Chip Design Center, IoT, Software, Operating System, AI, AR/VR, Gaming, Cyber Security, Data Analytics, PCB Design, Fabrication and SMT, and Mobile Phones Assembly/Manufacturing under one roof, thereby creating a comprehensive ecosystem for research, development, design, and pilot production.


IRADA Auditorium

In addition to Head Office, IRADA has inherited a regional office each in Lahore and Karachi, where agriculture products are formulated and sold in the markets of Punjab and Sindh provinces, generating revenue and self-sustaining the agri-business teams.

10. **Policies**. Major policies pertaining to HR, Finance and Procurement have been formulated and successfully enforced for enhanced operational velocity and efficiency.

Strategic Domains and Progress

11. **Key Verticals**. IRADA is organized around following key technology domains:

a. **Semiconductor Chip Design Center**. Indigenous IC design (digital, verification and analog mixed-signal) targeting national strategic requirements, with a first tape-out target of June 2027.

b. **PCB Design, Fabrication and SMT Assembly Line.** Re-commissioning of the PCB design, fabrication and SMT facilities, along with integration with manual assembly line to support indigenous electronics manufacturing capability.

c. **IoT and Embedded Systems.** Indigenous embedded and IoT integrated solutions for Agriculture, Energy and Industrial domain.

d. **Software, OS, AI, AR/VR, Gaming, Cyber Security & Network Infrastructure.** Hardened mobile OS, software and application development, AR/VR & game development, cyber security, sovereign AI capability, and enterprise network/data-center infrastructure.

e. **Mobile Assembly/Manufacturing**. Mobile assembly with an indigenously assembled rugged smart phone and a customized hardened OS for selective customers while state of art full features smart phone and OS for the commercial users.

f. **Agri-Tech**. The existing list of R&D products being diversified in terms of quality, classification, scale and exploring varied markets to contribute towards agri-product requirements within the country.

12. **Operational and Technological Roadmap**. The 3-Year Vertical Roadmap (FY 27 to 29) follows a phased (Foundation – Scaling – Maturity) model across technology verticals, supported by budgetary requirement of almost Rs. 1800 million and 355 planned highly skilled manpower:

Vertical	Foundation (FY 26-27)	Scaling (FY 27-28)	Maturity (FY 28-29)
Chip Design	Launch R&D on Critical Digital/mixed signal ICs and FPGA hardware testing.	Expand into FPGA design and verification services.	Focus on power management ICs and international design verification services.
IoT Design	R&D for smart agriculture and precision electronic systems.	Strengthen IoT solutions for agriculture, detonation systems and smart energy prototypes.	Localize IoT products and scale manufacturing with smart embedded solutions.
PCB Design & Fabrication	Establish PCB facility and launch pilot commercial services for technology localization.	Scale to multi-layer PCB and expand commercial operations.	Advance high-density fabrication, achieve ISO/IPC certification to establish Center of Excellence.

SMT Assembly Line	Establish a robust manufacturing foundation with operational readiness.	Accelerate production capacity and enhance process excellence.	Maximize efficiency with full scale operations.
OS, Software, AR/VR, Gaming, Cyber Security, Network Infrastructure	Build secure mobile OS, apps, AR/VR frameworks and initial games.	Deliver secure platforms, web/mobile solutions, AR/VR apps and games.	Deliver sovereign platforms, advanced simulators and diversified digital products.
Artificial Intelligence	Launch AI platform, chatbots, knowledge base and RAG solutions.	Scale AI automation with agents, copilots and fine-tuned LLMs.	Build sovereign AI ecosystem with LLMs, AI services and autonomous workflows.
Mobile Phones Assembly	Assemble smart phones for the defense.	Product diversification and manufacture smart phones for the public institutions.	Indigenization and Target commercial sectors and exports.
Agri-Tech	Enhance production capacity and distribution capability in Punjab.	Product diversification, scaling in Punjab and Sindh.	Strengthen footprint and expand to other provinces in the country.
Commercialization of local technologies, and Capacity	Initiation of training programs and workshops.	International certification and industry immersion programs.	Launch IRADA's certification body and programs in line with

Building of skilled HR & startups	Create national technology platform for innovators and startups. Initiate masterclasses with industry experts. Create tech transfer opportunities and IP filing support for top local products.	Devise competitive grant schemes and innovation challenges. Launch International Innovation Competitions and Hackathons. Utilize R&D fund for targeted industry problems by leveraging diaspora.	international standards. Establish an innovation cluster setup to incubate and accelerate local startups and connect them with national and international investors. Create a national commercialization wing incorporating industrial expertise for commercial licensing of local R&D products.

Note: *Joint Ventures, partnerships and commercialization efforts are embedded in operational and technological roadmaps*.

13. **Domain-wise Progress**. Though it is a nascent journey of six months yet gigantic efforts were launched to crystalize plans, operationalize and collaborate with both national and international stakeholders:

a. **Semiconductor Chip Design**

The program transitioned from planning to structured execution. Nineteen engineers were recruited in Phase-I, with ten more onboarding in July. Two strategically critical ICs, both relevant to Encryption and Security applications were shortlisted, as a result of engagement with National Radio and Telecommunication Corporation (NRTC). The design resources were organized into two digital design teams, two verification teams and

one analog team; top-level architecture, microarchitecture and initial RTL code have been developed for both ICs.

International fabrication pathways were opened with SMIC, China and SILTERRA, Malaysia alongside engagement with EPIC SEMI and GSME (Silicon Valley based companies) to shape a demand-driven design strategy. The PSDP PC-1 for semiconductor design, capacity building and ecosystem development in Pakistan has been submitted to Planning Commission.

b. **IoT and Embedded Systems**. During the first six months, the IoT & Embedded Systems Vertical established a dedicated core team and laid the foundation for developing indigenous IoT-based solutions to address industrial and domestic needs. The team focused on building organizational and technical capabilities, identifying priority application areas and preparing development plans for Smart Agriculture, Smart Energy, Industrial Automation, Healthcare and Precision Electronic Systems. Initial concept validation, technology assessment and prototype planning were completed for the identified projects. Strategic partnerships were also initiated with industry and academic institutions to support collaborative research, product development and future commercialization. These efforts have established a strong platform for developing self-reliant IoT solutions and advancing prototype development in the next phase.

c. **PCB Design, Fabrication and SMT Assembly Line**. Activities during the reporting period focused on recommissioning, infrastructure planning and industrial engagement. A three-year operational roadmap was developed, while planning was undertaken for the relocation and recommissioning of the PCB fabrication facility. A comprehensive gap assessment of the SMT production lines was also carried out, followed by redesign of the facility to align with contemporary localization requirements. Consultations were held with a global home appliances manufacturing company (Arcelik/Dawlance) to explore potential collaboration in PCB design and fabrication, SMT assembly and localization of electronic products, with the

objective of supporting both industrial requirements and in-house R&D initiatives. In parallel, follow-up is continuing on the submitted PC-1 proposals for facility upgradation and modernization. The next phase will focus on re-establishing and commissioning the PCB fabrication facility, revitalizing the SMT production lines and initiating pilot-scale manufacturing.

d. **Mobile Phone Assembly/Manufacturing**. Smart phones are being assembled initially in SKD/CKD format with a hardened OS to fulfill the requirements of defense. Meanwhile, process of indigenization in manufacturing has also been catalyzed in line with the government policies to cater for both commercial markets and exports to friendly countries with full range of digital/smart devices.

e. **Software, OS, AI, AR/VR, Gaming, Cyber Security & Network Infrastructure**. The verticals were established with capability frameworks, organizational structures and long-term R&D plans. Enterprise network and data-center infrastructure was designed, including a high-speed fiber backbone, structured cabling, secure switching, server deployment, CCTV and access-control integration. High-capability technical resources were identified across Software Engineering, AR/VR & Game Development, Network Infrastructure and Cybersecurity, and academia partnerships were initiated to build specialized talent in Android OS and AI through internships and collaborative research.

f. **Agri-Tech**

The organizational restructuring and business transformation was carried out in the first half of the year resulting in improved cross-functional coordination and deliverables. A structured data analytics framework was also integrated into business operations to generate market intelligence, monitor business performance, support demand forecasting, and enable data-driven strategic decision-making.

Comprehensive product portfolio reviews, competitor benchmarking, and market analyses were undertaken to improve product

positioning, support market expansion, and identify new business opportunities. Operational efficiency was further enhanced through reduced operating costs, digitization of inventory systems, improved raw material planning, and standardized production governance. In addition, selected R&D products developed in collaboration with the Nuclear Institute for Agriculture and Biology were successfully formulated and introduced into the market, while a tender with Rafhan Maize Products Company further strengthened the industrial business portfolio.

To strengthen market presence, a dedicated field sales force was deployed to conduct regular market visits, engage dealers and farmers, improve product availability, address market misconceptions, monitor dealer performance, and promote awareness and effective use of IRADA's Agri-tech products. Dedicated sales outlet has been established in Lahore, significantly enhancing customer accessibility, brand visibility, and market outreach. The receipt of Punjab Agriculture Distributor License, is another important milestone enabling direct market access and expanding the organization's sales network while the similar efforts are underway for Sindh as well.

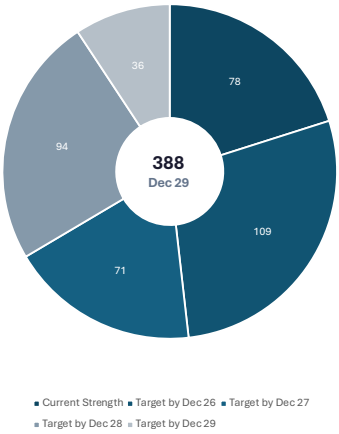
14. Human Resources

Besides formulation and implementation of comprehensive HR policy, selection and onboarding of highly qualified HR remains the focus of effort. Mr. Bader Qurashi, having over three decades experience in Silicon Valley with global technological titans, recently joined as CTO. With a rigorous selection process in place, first batch of engineers, majority of them qualified from NCDC, NUST, has been inducted in Chip Design, Software and IoT verticals. Similarly, rightsizing was carried out in regional offices Lahore and Karachi with experienced staff to improve the deliverables.

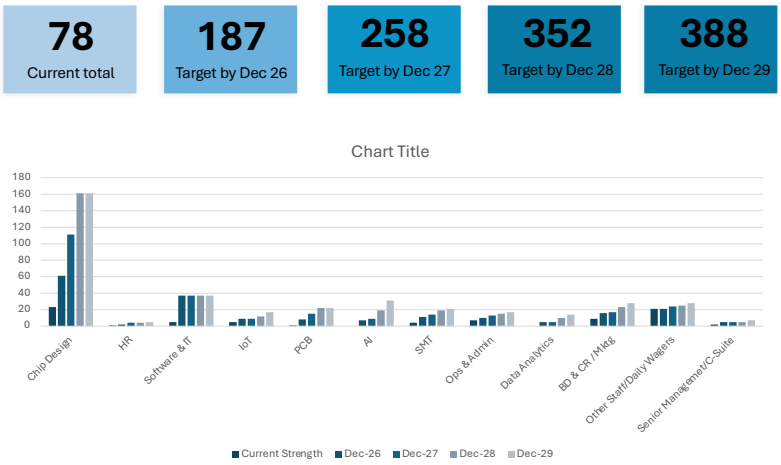
Currently, the total number of employees in IRADA stands at **78**, with **47** officers in Islamabad, **14** in Lahore, and **17** in Karachi respectively. The selection of another **9** Engineers has been completed for joining in August 2026, while IRADA funded scholarship of another **10** engineers from FAST-NUCES with guaranteed employment in IRADA already introduced in the upcoming MS IC Design Program 2026-2027.

The three years hiring program 2026-2029 is already in place with a purpose of having a lean, smart, innovative and self-sustainable organization to drive innovation and contribute to the economic development of the country.

Inductions by Dec 29



Scaling up to Dec-29



Strategic Collaborations and Partnerships

15. Industry

a. **Wah Nobel and Biafo**. Engagement for reverse engineering of precision electronic system.

b. **GSME and EPIC SEMI**. Engaged to shape a demand driven chip design strategy alongside local industry.

c. **SMIC and SILTERRA**. International engagements to secure semiconductor fabrication pathways.

d. **Arcelik/Dawlance**. Avenues explored in PCB design and fabrication for consumer electronics.

e. **RWR and AKSA**. A future collaboration was mutually agreed for research & development in emerging technologies.

16. **Academic Institutions**

a. **FAST-NUCES**. An awareness session was held by IRADA for semiconductor chip design initiatives, attended by faculty and students. Agreement was signed for an MS Chip Design fellowship, whereby IRADA is sponsoring ten engineers, who will join the chip-design team after completing their MS and tape-out projects.

b. **GIKI**. MoU in process for chip design, active engagement with the IoT & Embedded Systems vertical for collaborative R&D and technology commercialization.

c. **NED University of Engineering & Technology**. MoU in process for chip design, active engagement with the IoT & Embedded Systems vertical on the same basis.

d. **NUST**. Engagement with RIC for collaboration avenues in R&D, Software Development and Innovation with NSTP and National Centers for Excellence in AI and Robotics.

17. **Government**

a. **NRTC**. Potential end user for the two critical ICs, and a collaborative R&D partner for the IoT & Embedded Systems vertical.

b. **National Electronics Complex of Pakistan (NECOP).** Collaborative R&D Partner for joint chip design projects.

18. **Events and Summits**. IRADA made significant contributions by becoming an organizer, partner or participant in many of the events and summits with details as under:

MD IRADA delivering keynote addressing at Pakistan Semiconductor Summit

a. **Pakistan Semiconductor Summit 2026**. A keynote address was delivered by MD titled 'IRADA - An Initiative to Drive Innovation in Niche Domains and Semiconductor Chip Design' at the Pakistan Semiconductor Summit held at LUMS on 27-29 March 2026, attended by key stakeholders and founders from Pakistan and abroad. The summit provided a focused platform to align talent with industry needs, foster cross-sector collaboration, and build global bridges that accelerate Pakistan's integration into the semiconductor value chain.

b. **Harvard Health Systems Innovation Lab Hackathon**. The annual global hackathon by Harvard HSIL on the theme 'Building High-Value Health Systems: Leveraging AI' was conducted by IRADA in collaboration with Harvard University and NIC Islamabad on 13th – 14th April 2026. This year's Pakistan Hub was conducted simultaneously in 36 countries with more than 50 Hubs and 14000 innovators participating. A distinguished panel of judges and mentors took part in the event, with participating teams from all over the country.

Team IRADA with industry experts at Harvard HSIL

c. **Pakistan's Startup Shortlisted in Global Top 50**. The winning team EMRChains - qualified to the Top 50 globally, following two weeks of intensive venture development and refinement in the Bootcamp by Harvard University. During this time, teams were introduced to the fundamentals of venture development, engaged in the HSIL Innovation Circle for networking and collaboration, and gained access to a range of resources. In addition, Microsoft provided $1,000–$5,000 in credits per participant, and $25,000 in credits per venture team.

MD IRADA giving certificate to the winner team "EMR Chains"

UN Conference'26 by Paklaunch
Opening Ceremony

Industry experts panel discussion at
UN Conference'26

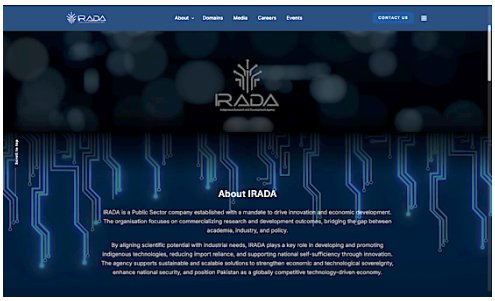
d. **Pakistan's 1st UN Conference'26**. IRADA partnered with Paklaunch to conduct Pakistan's 1st UNConference'26 – a high-impact, closed-door gathering bringing together key players shaping the future of startups and venture capital. The event was attended by 120+ founders and investors, featuring meaningful engagements and a shared vision for progress. The UNConference'26 was the 8th edition of the global event, and the 1st in Pakistan.

e. **Wafa-e-Arz**. A WhatsApp group consisting of select national and international tech experts was created to foster new ideas and drive innovation by leveraging the diaspora and enabling connections.

Wafa-e-Arz WhatsApp Group

19. **Marketing**

a. **Official Website**. The official website of IRADA was developed, outlining the core objectives of the company and highlighting its key business verticals. Customer engagement forms have also been developed for exploring partnership avenues and engaging visitors. Final changes are under development, after which the website will be active for mass projection, following the soft launch.



IRADA Website landing page

b. **Social Media Handles**. Social Media handles have been activated

Linkedin: https://www.linkedin.com/company/irada-pk
Facebook: https://www.facebook.com/iradapvt.ltd/
Instagram: https://www.instagram.com/irada.pakistan
X: https://x.com/irada_pakistan
Youtube: https://www.youtube.com/@IRADA.pakistan

Job postings in different departments continue to be advertised as vacancies open up. IRADA's **YouTube Channel** has also been launched**,** with plans to operationalize the studio in the next phase to include podcasts and masterclasses by industry guests. In parallel, official social media handles for STEDEC (brand name of agri-products) have also been established. The scope and design of the STEDEC website have been finalized, with the development and implementation phase in process.

Conclusion

IRADA is gradually establishing itself as the national hub of technology and innovation, emerging as the central body for creating synergy among all relevant stakeholders in the S&T ecosystem. It has travelled an initial six months journey by completing physical revamping and systemic restructuring in line with the SOEs Act and Policy 2023. The operationalization of the facility is in its full swing to achieve irreversible operational tempo. IRADA has also established a credible network, based on a triple-helix model, with both national and international technology leaders, thereby enabling itself to implement operational and technological roadmaps through collaborative efforts and indigenous capabilities.