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Empowering Punjab's Youth with Modern Skills

Pakistan, particularly Punjab, is currently at a unique population advantage due to its large youth population. Unfortunately, this valuable human capital has not been effectively connected with modern technology, research, and local industry. Most young people still rely on traditional apprenticeships, substandard workshops, or limited vocational institutions where they are taught only repair and installation skills rather than product design, manufacturing, research, and innovation. As a result, Pakistan imports billions of dollars' worth of electronic, solar, electrical, and mechanical components every year, causing a significant outflow of foreign exchange while leaving domestic industries unable to compete globally.

Although Punjab has institutions such as the Technical Education and Vocational Training Authority (TEVTA), the Punjab Vocational Training Council (PVTC), and government polytechnic colleges, their curricula and laboratory facilities are not fully aligned with the rapidly evolving needs of modern industry. The world is moving towards artificial intelligence (AI), robotics, the Internet of Things (IoT), embedded systems, 3D printing, CNC machining, electric vehicles, lithium battery technology, and advanced solar manufacturing. In contrast, many of our training institutions continue to focus on conventional technical skills. Consequently, local industries remain dependent on imported components instead of manufacturing high-quality products domestically.

The solar energy sector is one of the fastest-growing industries worldwide. However, most of the solar panels, inverters, MPPT and PWM charge controllers, battery management systems (BMS), lithium batteries, smart energy meters, Wi-Fi monitoring devices, power electronics, control circuits, MOSFETs, IGBT modules, transformers, inductors, heat sinks, circuit breakers, MC4 connectors, mounting structures, and numerous other essential components used in Pakistan are imported. If these products and their components were manufactured locally, Pakistan could substantially reduce imports while creating a new industrial economy.


Analysis
Zain-ul-Abideen Abid

Similarly, home-based manufacturing and micro-industries have become key pillars of modern economies. In many countries, thousands of small manufacturing units produce plastic housings, printed circuit boards (PCBs), resistors, capacitors, diodes, transistors, integrated circuits (ICs), wiring harnesses, switches, plugs, motors, bearings, gears, connectors, rubber seals, and many other components for larger industries. Pakistan also has the potential to establish thousands of such businesses, provided that young people receive practical training in advanced manufacturing, product design, prototyping, and industrial research.

A review of the world's most successful economies including China, Germany, South Korea, Japan, and Türkiye shows that their industrial growth was built not only on vocational education but also on strong collaboration between research institutions, industry, and educational organizations. Young people in these countries are not merely trained to operate machines; they are encouraged to invent new products, practice reverse engineering, obtain patents, establish startups, and compete in international markets. Punjab can successfully adopt a similar model.

The Government of Punjab should establish a Centre for Innovation, Research and Advanced Technology (CIRAT) in every division. These centers should integrate solar manufacturing, electronics, robotics, 3D printing, PCB design, CNC machining, injection molding, battery assembly, product testing, incubation centers, patent and innovation cells, and startup support under one roof. The objective should not merely be to award certificates but to enable young entrepreneurs to design, manufacture, and commercialize their own products.

The government should also promote public-private partnerships (PPP) by involving industries directly in these centers. The government should provide infrastructure, buildings, qualified instructors, and research facilities, while private industries contribute advanced machinery, internships, industrial mentoring, and market access. Interest-free or low-interest loans, startup funds, technology vouchers, and export support programs should be introduced so that young people become job creators rather than job seekers.

There is also an urgent need to modernize the curricula of TEVTA, PVTC, and polytechnic institutions in accordance with international industrial standards. Subjects such as solar electronics, PCB design, Surface Mount Technology (SMT), embedded systems, Arduino, Raspberry Pi, PLC automation, EV charger manufacturing, electric bike controllers, lithium battery assembly, industrial automation, and artificial intelligence should become integral parts of technical education. Strong partnerships should also be established between universities, industries, and research organizations so that academic research is transformed into commercial products, patents, and export opportunities rather than remaining confined to scholarly publications.

The government should further encourage domestic manufacturing by

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Affordable Fertilizer: The Foundation of Pakistan's Food Security

Agriculture remains the backbone of Pakistan's economy, contributing significantly to the country's GDP, employment, and food security. At a time when farmers are grappling with rising production costs, climate-related challenges, and market uncertainties, ensuring the timely availability of fertilizers at affordable prices is not merely an agricultural issue—it is a national priority. The recent meeting chaired by Federal Minister for National Food Security and Research Rana Tanveer Hussain, alongside Punjab Agriculture Minister Syed Muhammad Ashiq Hussain Shah, reflects the government's recognition of this critical challenge.

The assurance that there is no shortage of fertilizers in the country is an encouraging development. Reports of scarcity often trigger panic buying, hoarding, and artificial price hikes, placing unnecessary financial pressure on farmers. The government's confirmation that fertilizer manufacturing plants are operating normally and that sufficient stocks are available should help restore confidence among growers preparing for the upcoming crop season.

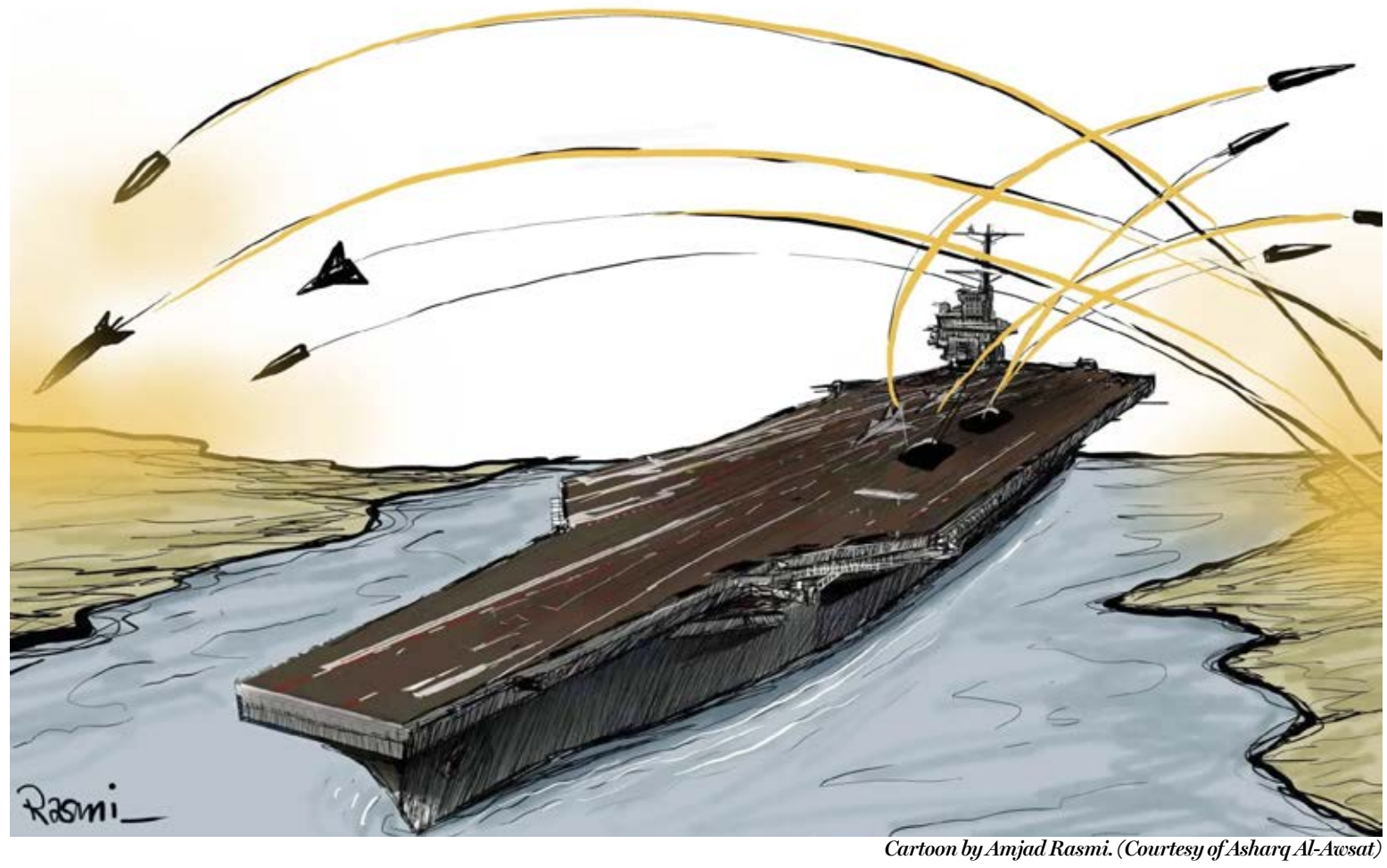
However, availability alone is not enough. The real concern for farmers is affordability. Fertilizer prices have risen sharply over recent years, significantly increasing cultivation costs and reducing profit margins. By urging fertilizer companies to lower urea prices, the federal government has taken a positive step toward easing the financial burden on farmers. Such efforts must continue through constructive dialogue with manufacturers while ensuring that price reductions are sustainable and do not disrupt production.

Equally important is the coordination between the federal and provincial governments. Agriculture is a shared responsibility, and effective cooperation is essential to ensure smooth distribution, eliminate supply bottlenecks, and prevent market manipulation. The commitment by the Punjab government to work closely with the federation demonstrates the collaborative approach needed to safeguard farmers' interests across the country.

At the same time, stronger regulatory oversight is necessary to curb hoarding, black marketing, and profiteering, particularly during peak sowing seasons. Digital monitoring of fertilizer stocks, transparent distribution systems, and strict enforcement against illegal practices can help ensure that subsidies and market benefits reach genuine farmers rather than intermediaries.

Looking beyond the immediate season, Pakistan must adopt a long-term strategy for agricultural sustainability. Promoting balanced fertilizer use, encouraging soil testing, investing in research, and supporting modern farming practices will improve productivity while reducing unnecessary input costs. Farmer awareness programs can also play an important role in enhancing fertilizer efficiency and environmental sustainability.

Ultimately, affordable fertilizer is more than an input for farming—it is an investment in national food security, rural prosperity, and economic stability. If the government's commitments are backed by consistent implementation, transparent market regulation, and continued cooperation among all stakeholders, Pakistan's farmers will be better equipped to increase productivity, strengthen food supplies, and contribute to sustainable economic growth.



Cartoon by Amjad Rasmi. (Courtesy of Asharq Al-Awsat)

Glacier Melting and Water Availability in Pakistan

Pakistan faces an unprecedented environmental and water security crisis as its glaciers continue to melt at alarming rates due to climate change. The Karakoram, Hindu Kush, and Himalayan mountain ranges contain some of the world's largest concentrations of glaciers outside the Polar Regions, collectively storing vast quantities of freshwater that sustains the livelihoods of over 200 million Pakistanis.

These glaciers feed the Indus River system, which supplies water for agriculture, hydropower generation, and domestic consumption across the nation. However, accelerating glacier retreat threatens the long-term availability of water resources that Pakistan depends upon for economic development and survival. The relationship between glacier melting and water availability in Pakistan, exploring the causes of glacial retreat, its current impacts on water resources and the potential consequences for the nation's future.


Analysis
Dr. Muhammad Shahzad Ashfaq

Pakistan contains approximately 7,253 glaciers covering an area of roughly 13,680 square kilometers, making it the largest reservoir of ice outside the Polar Regions. The Indus River basin, which depends heavily on glacial meltwater, supports agriculture on approximately 16.2 million hectares of irrigated land and provides water to nearly 180 million people.

The Karakoram Range alone contains over 3,000 glaciers, including the Siachen Glacier, the world's longest glacier outside the Polar Regions, and the Baltoro Glacier. These ice masses act as natural water towers, storing precipitation as snow and ice during winter months and releasing it gradually during the warmer months when water demand is highest. This natural water storage mechanism has historically allowed Pakistan to balance seasonal water availability and support a thriving agricultural economy that comprises approximately 18.5% of the nation's GDP and employs roughly 43% of the workforce.

The hydrological significance of glaciers extends beyond immediate water supply. The cold, relatively pure meltwater from glaciers flows into major river systems, including the Indus, Sutlej, and Chenab rivers, which form the backbone of Pakistan's Indus Basin Irrigation System. This system, developed during the British colonial period and expanded in the decades following independence, represents one of the world's largest coordinated irrigation networks. The system's functionality depends critically on the timing and volume of water flows, with glacial melt playing a crucial role in maintaining adequate supplies during the dry season when precipitation is minimal.

Scientific evidence demonstrates that Pakistan's glaciers are retreating at an accelerating pace, most glaciers in the Himalayas and Hindu Kush have been in continuous retreat since the late 19th century, with the rate of retreat intensifying significantly since the 1990s. Temperature increases in the mountain regions have exceeded the global average warming trend, a phenomenon known as high-mountain amplification. This amplified warming effect is particularly pronounced in Pakistan's northern mountain ranges, where temperatures have increased by approximately 0.3°C per decade, roughly double the global average.

The Siachen Glacier, despite being located in a heavily glaciated region, has experienced a retreat of several hundred meters over the past two decades. Similarly, the Baltoro Glacier and numerous smaller glaciers throughout the Karakoram, Hindu Kush, and Himalayan ranges show consistent evidence of mass loss. Remote sensing data and field measurements have documented that many glaciers that extended across multiple kilometers just fifty years ago have now fragmented into smaller segments separated by exposed rock and moraines. Some glaciers have completely disappeared entirely, leaving behind proglacial lakes that present new hydrological and hazard challenges.

The acceleration of glacier melt is driven by multiple factors working in combination. Rising atmospheric temperatures remain the primary driver, as increased heat melts glacier surfaces during the ablation season. Reduced precipitation, particularly in winter months, limits the accumulation of new snow and ice that would otherwise offset melting losses. Additionally, dark-colored dust and soot particles, transported from urban and industrial areas and deposited on glacier surfaces, reduce the albedo or reflectivity of glaciers, causing them to absorb more solar radiation and melt more rapidly. Anthropogenic black carbon emissions from fossil fuel combustion and biomass burning represent a significant contributor to accelerated glacier melting in the Hindu Kush-Karakoram-Himalayan region.

The relationship between glacier melting and water availability in Pakistan presents a complex paradox in the short to medium term. As glaciers retreat, the increased rate of meltwater release actually augments water availability in many river basins. This phenomenon, known as peak water, represents a transitional period during which accelerated melting

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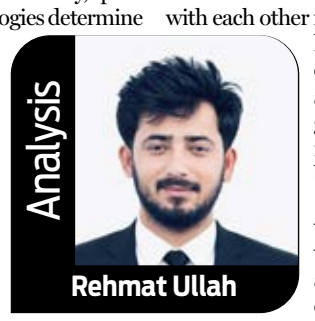
Science and Technology Diplomacy Importance of Foreign Policy of Pakistan in the Contemporary World

There are numerous changes in the field of international relations. Unlike military strength and economic stability that were among the most influential components in the past, now scientific innovations play an equally important role in establishing power. Artificial intelligence, quantum computing, biotechnology, cybersecurity, space exploration, and digital technologies determine the dynamics of international politics. In these conditions, science and technology diplomacy becomes one of the most essential elements of foreign policy.


Analysis
Rehmat Ullah

Science and technology diplomacy is an activity aimed at using scientific knowledge and cooperation in the sphere of technologies to enhance international relations and solve global issues. There are three elements of science and technology diplomacy. Firstly, it involves scientific cooperation of researchers from different countries within the framework of diplomatic relations. Secondly, scientific information is used as the basis for decision-making in terms of climate change, public health, food security, and environmental protection. Thirdly, science and technology cooperation can serve as a tool to reconcile the countries with worsening political relations.

The COVID-19 crisis has shown us the significance of scientific collaboration and has led to sharing of information, development of vaccines, saving of millions of lives, and much more. Similarly, tackling climate change at the global level needs a great deal of science and technology. Cooperation between the scientists and diplomats will be necessary in order to arrive at an agreement concerning carbon emissions, renewable energy sources, and climate change adaptations.

There has been a growing role of technological rivalry in the politics of the contemporary world. The US and China are engaged in competing with each other in fields such as artificial intelligence, production of semiconductors, quantum technologies, and communication technologies. Technology has become a matter of security apart from being an economic power.

Furthermore, the application of science in diplomacy to achieve cooperation even against political differences can also be seen through the collaborative science projects that are carried out in science by nations having strategic differences. This is an explicit illustration that science is the forum of discussion when there is no diplomatic discussion between countries. In today's world, there is much geopolitical competition; therefore, scientific diplomacy has become one of the very few forums of discussion between nations.

Science and technology diplomacy is very important for the developing nations as this can help them in accessing networks, technology, investment, expertise and innovative environment for sustainable development. Those countries which support their scientific strengths are

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