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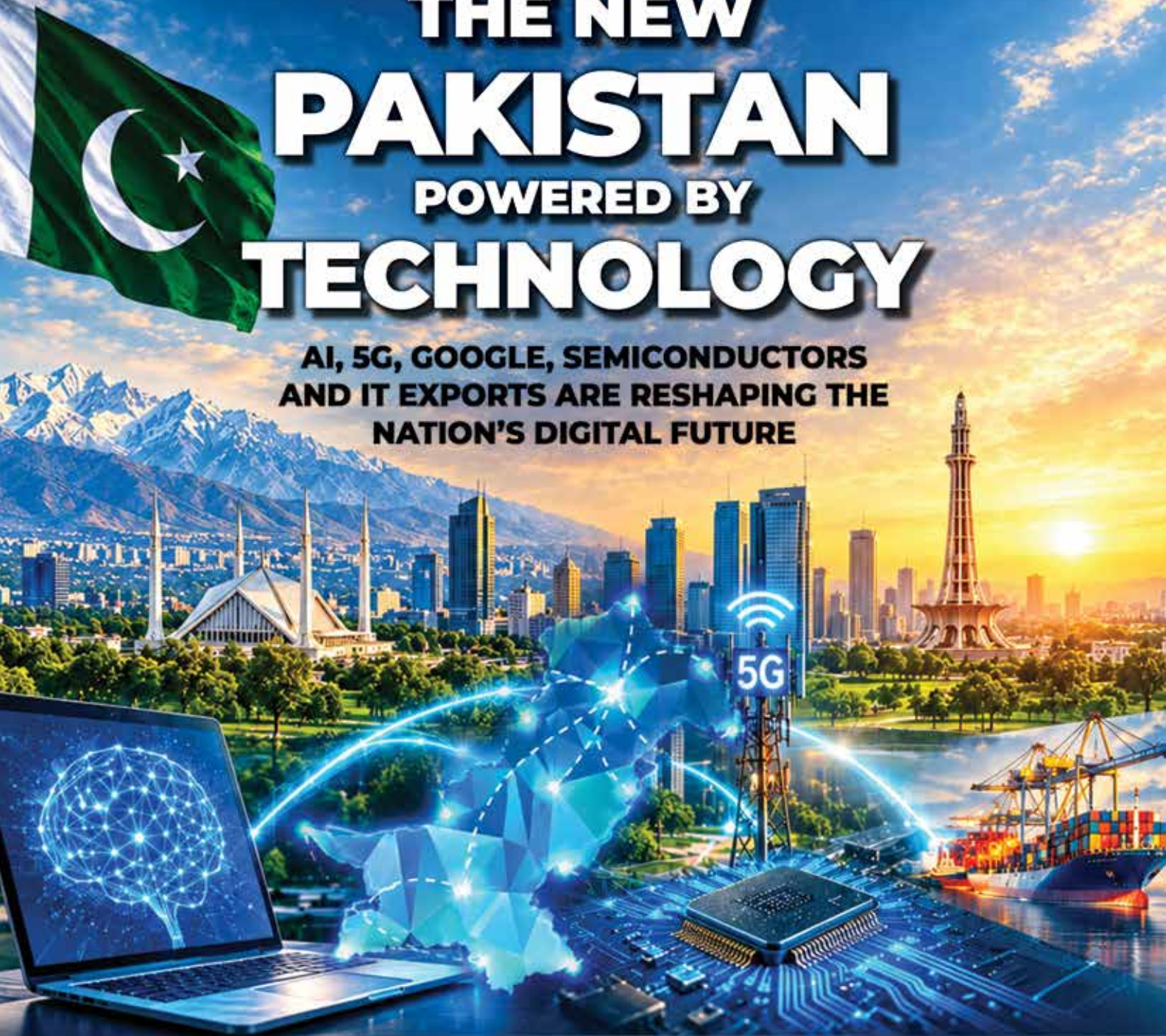
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OCTOBER 2026

THE NEW PAKISTAN POWERED BY TECHNOLOGY

AI, 5G, GOOGLE, SEMICONDUCTORS
AND IT EXPORTS ARE RESHAPING THE
NATION'S DIGITAL FUTURE



IN THIS ISSUE

FROM OCEAN TANKER TO
YOUR FUEL TANK: THE
JOURNEY OF PETROLEUM
IN PAKISTAN

SAUDI ARABIA'S ELECTRIC
CAR: XUBOT, 670 KM IN 30 MINUTE
CHARGING AND LESSONS
FOR PAKISTAN

GRID FORMING - A MYTH
OR REALITY OR FUTURE
OF POWER SYSTEMS

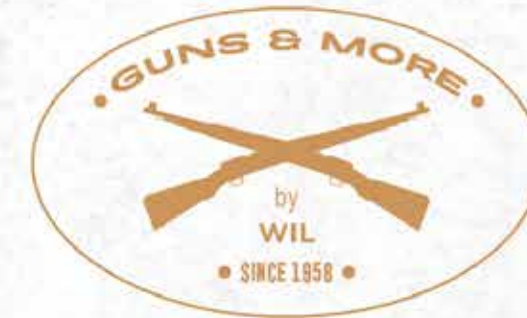
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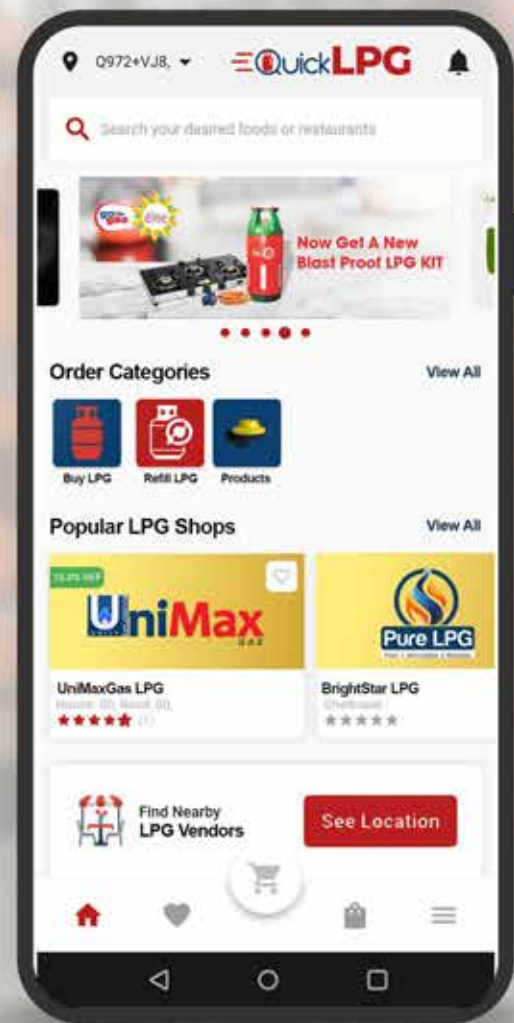


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EDITORIAL



THE NEW PAKISTAN: BUILDING A TECHNOLOGY- POWERED FUTURE

Pakistan stands at an important turning point in its technological journey. For years, the country's digital transformation was largely associated with mobile connectivity, software houses and freelancing. Today, the landscape is changing rapidly. Artificial intelligence, 5G, cloud computing, semiconductors, data centres, digital government and international technology partnerships are emerging as important pillars of Pakistan's economic future.

The arrival of Google's first office in Pakistan, the country's transition toward 5G, the development of a national semiconductor education and research framework and the continued growth of IT exports reflect a broader transformation. Pakistan is no longer simply asking how to connect its population to the digital world. The more important question is how it can use technology to create value, generate exports, develop industries and provide better opportunities for its young population.

Artificial intelligence is likely to be one of the most powerful forces shaping this transformation. AI is moving rapidly into businesses, education, healthcare, agriculture, finance, manufacturing and government. Pakistan's emphasis on AI education and mass upskilling is therefore significant. With a large young population and an expanding community of software developers, engineers, freelancers and entrepreneurs, Pakistan has a substantial human resource base from which an AI economy can develop.

But technology does not create prosperity by itself. Skills must be matched with infrastructure, investment, research and an environment that allows businesses to grow. Pakistan must move beyond basic digital literacy and develop expertise in AI engineering, data science, cybersecurity, cloud computing, chip design and advanced software development.

The growth of Pakistan's IT and IT-enabled services exports demonstrates what is possible. Digital services can reach international customers without the physical infrastructure traditionally required for exports. The next challenge is to move from individual freelancing and small service providers toward larger companies capable of developing global products, intellectual property and internationally recognised technology brands.

The introduction of 5G adds another important dimension. Faster and more capable connectivity can support smart manufacturing, telemedicine, intelligent logistics, precision agriculture, connected vehicles and industrial automation. Yet the success of 5G will depend on much more than spectrum. Fibre networks, data centres, cloud infrastructure, reliable electricity and cybersecurity must develop alongside mobile connectivity.

Pakistan's emerging semiconductor programme is equally important. The country is unlikely to compete immediately with established global chip manufacturing centres, but semiconductor design, research, testing, embedded systems and specialised engineering offer potential areas for developing expertise. Building a skilled workforce today could create capabilities for a much broader technology ecosystem tomorrow.

The same principle applies to data centres and cloud computing. As AI and digital services expand, computing capacity and secure data infrastructure will become increasingly strategic. Pakistan will need reliable power, high-speed connectivity, cybersecurity and predictable regulatory frameworks to support this digital infrastructure.

Ultimately, Pakistan's greatest technology asset is its people. Universities, industry and government must work together to ensure that education keeps pace with technological change. Greater participation of women, opportunities beyond major cities and stronger links between universities and industry can further expand the country's talent base.

The opportunity is significant, but success will depend on implementation. Technology policies must translate into measurable outcomes for citizens, businesses, students and entrepreneurs. Pakistan must create an environment where innovation is encouraged, investment is supported, digital systems are trusted and companies can compete internationally.

The new Pakistan will not be built by technology alone. It will be built by people who know how to use technology to solve problems, create businesses, develop industries and connect the country with the global economy. The digital future is already taking shape. The challenge now is to turn Pakistan's technological potential into sustainable economic opportunity.

Shahid A. Khan

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FROM PORT TO PETROL PUMP: THE JOURNEY OF FUEL IN PAKISTAN



AZHAR RAFIQUE
Member, Advisory Board
TechnoBiz

HOW ONE LITRE OF PETROL OR DIESEL TRAVELS THROUGH A COMPLEX NATIONAL SUPPLY CHAIN BEFORE REACHING YOUR VEHICLE

Every day, millions of Pakistanis visit petrol stations, fill their vehicles and continue their journeys without thinking about where that fuel came from. But behind every litre of petrol or diesel is a sophisticated chain involving international suppliers, ports, terminals, refineries, storage facilities, pipelines, road tankers, railways, oil marketing companies and petrol stations.

The journey begins either with imported crude oil and refined petroleum products or with crude oil processed by Pakistan's domestic refineries. Pakistan remains significantly dependent on imports to meet its petroleum requirements. OGRA has reported that around 80 percent of the country's crude oil and refined petroleum requirements are met through imports, while local refineries supply a substantial portion of domestic demand. Petrol and diesel remain the principal transportation fuels.

For imported fuel, the journey begins at Pakistan's ports. Keamari and Port Qasim are important gateways for crude oil and refined petroleum products. From these locations, products are transferred to storage and terminal facilities operated by refineries and oil marketing companies. These facilities provide the essential link between international shipments and the domestic fuel market.

The next stage is refining. Crude oil is processed in refineries into various pe-

troleum products, including petrol, diesel and other fuels. Pakistan has been working toward modernization of its refining sector to improve efficiency and fuel quality.

The ability to refine more petroleum domestically is important because it can strengthen supply security and reduce reliance on imported finished products.

After refining or importation, fuel enters the storage network. Storage is one of the least visible but most important parts of the petroleum system. Large quantities of petrol and diesel must be stored safely so that supplies can continue reaching consumers even when there are delays in imports, transportation challenges or unexpected increases in demand.

From terminals and storage facilities, petroleum products move toward regional depots and distribution points. This movement takes place through several modes, including pipelines, road tankers and, to a more limited extent, railway tank wagons. The distribution network extends from Karachi to major urban centres and remote parts of the country.

Oil marketing companies are at the heart of this distribution process. They coordinate fuel procurement, storage, transportation and delivery to thousands of retail outlets. Pakistan State Oil, for example, reports a network of more than 3,500 retail outlets, 23 depots and nine installations across the country.

Quality control is required throughout the journey. Fuel is tested at different points to ensure that it meets applicable specifications. At the retail level, dispensing equipment also needs appropriate maintenance and calibration so that consumers receive

the correct quantity. OGRA regulates important aspects of the downstream oil sector, including licensing, quality monitoring and handling of sector-related complaints.

Safety is equally important. Petroleum products are highly flammable, so every stage requires appropriate engineering standards, operating procedures, fire protection and emergency preparedness. A modern fuel supply chain is therefore not simply a logistics operation; it is also a national safety system.

Technology is now becoming increasingly important. Digital inventory management, automated monitoring, GPS-enabled transportation, electronic documentation and real-time supply-chain information can improve visibility and help companies and regulators respond more quickly to changes in demand or supply. In September 2026, the Petroleum Division was also reviewing supply-chain, transportation and logistics arrangements to help maintain uninterrupted fuel availability across Pakistan.

What appears to be a simple transaction at a petrol pump is actually the final stage of a nationwide energy network. Keeping that network reliable requires investment, regulation, safety, quality control, adequate storage and efficient logistics.

Pakistan's economic activity depends heavily on this system. Transport, agriculture, industry, aviation, commerce and everyday mobility all depend on reliable fuel supplies. Strengthening every link from port to petrol pump is therefore essential for energy security, economic resilience and public confidence.

The next time you fill your vehicle, remember that the fuel in your tank has completed a remarkable journey. From an overseas tanker or a Pakistani refinery to a storage terminal, depot and finally the petrol station, every litre represents a coordinated national supply chain keeping Pakistan moving.



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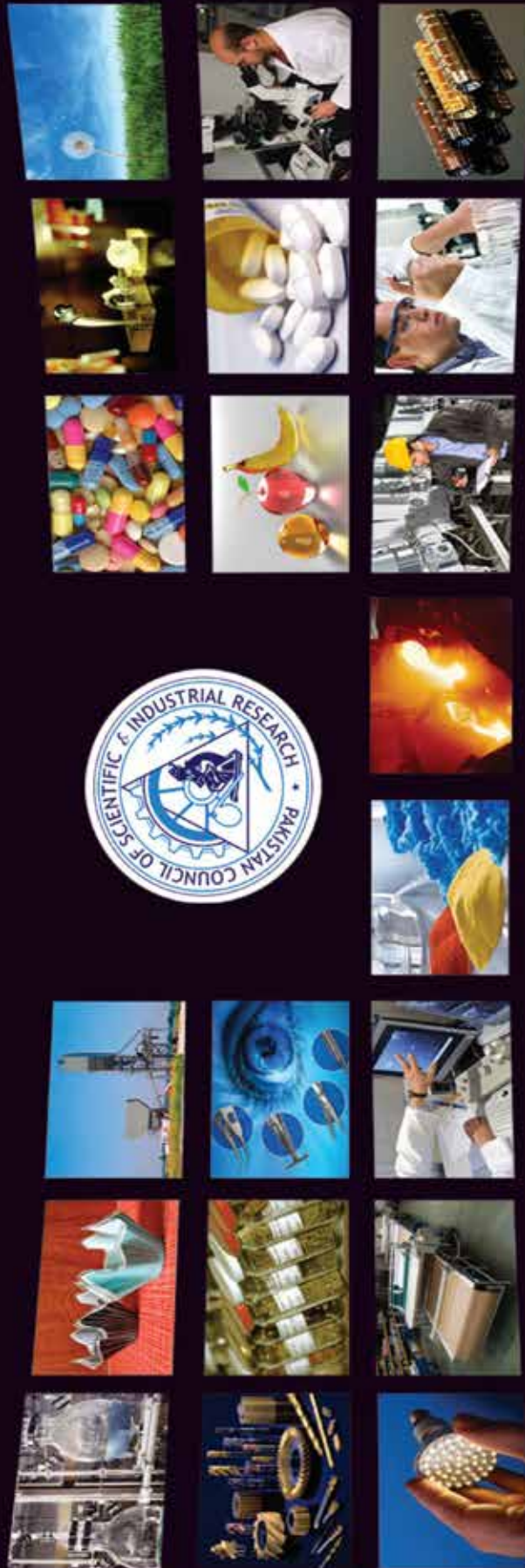
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XGIMI AURA X3 MAX: CINEMA AT HOME

The XGIMI Aura X3 Max brings an impressive combination of ultra-short-throw technology, brightness and smart entertainment to the home cinema experience. The projector can produce a remarkably bright and sharp 120-inch image from just around 20cm away, making it particularly attractive for living rooms where space is limited. XGIMI claims it is the world's first 4K 120Hz ultra-short-throw projector, with up to 5,700 ISO lumens and an 8,000:1 contrast ratio. Its RGB triple-laser light engine, anti-rainbow-effect technology and dynamic dual iris are designed to deliver vivid, detailed images with strong contrast. The package also includes Google TV, VRR and ALLM support for modern gaming and streaming, while an 80W Harman Kardon audio system provides powerful built-in sound. The projector can support screens up to 200 inches, turning an ordinary living room into a highly immersive entertainment space. Its advanced image processing is designed to maintain clarity and smooth motion even on extremely large displays. For movie enthusiasts, gamers and users seeking a premium home-theatre setup, the Aura X3 Max offers an impressive blend of performance, convenience and cutting-edge projection technology.



POWEROLOGY HELIO 1600W

The Powerology HELIO 1600W Portable Solar Power Generator is a versatile portable power station designed to keep compatible devices and equipment powered wherever you go. It features a 1024Wh LiFePO4 battery with a 40Ah, 25.6V configuration, delivering reliable energy storage for outdoor activities, travel, emergencies, and backup power. Its 1600W pure sine wave AC inverter provides 230V output with up to 3200W peak power for compatible equipment. The HELIO also includes a built-in 40W foldable solar panel, offering convenient solar charging, while its DC input supports up to 240W. Multiple output options include 100W USB-C PD, dual USB-A ports, dual DC5525 outputs, and a 12V car outlet, allowing you to charge and power different devices from one unit. Compact and portable, the HELIO combines substantial battery capacity, flexible charging options, and multiple connections into a convenient solution for reliable portable electricity. It is ideal for camping, road trips, outdoor work, emergency preparedness, and situations where dependable power is needed away from conventional electrical outlets. It also offers convenient portability, dependable performance, and flexible charging for everyday power needs.



USB Bag Sealing Machine

Keep your snacks, dry foods, and everyday food packets fresh with this Portable Rechargeable USB Bag Sealing Machine. Designed for convenience and easy storage, it features 6 adjustable heat-sealing modes to suit different types of heat-sealable plastic bags. Its compact, lightweight design makes it ideal for use in the kitchen, office, travel, or anywhere you need quick and reliable sealing. The rechargeable USB design eliminates the need for constant battery replacement, while the simple one-button operation and digital display make sealing effortless. Perfect for resealing chips, tea, nuts, snacks, and other food-storage bags, it helps protect contents from air and moisture. The package includes 1 portable bag sealing machine, providing a practical solution for keeping opened food packets neat, fresh, and securely closed. A handy everyday kitchen accessory for convenient food storage and organization.



Handheld Wall Paint Roller

Effortlessly refresh and maintain your walls with the Handheld Wall Paint Roller Applicator, a convenient solution for quick marks, stains, and touch-ups. Designed with an integrated paint bottle and roller head, this compact all-in-one tool eliminates the need for bulky paint trays, brushes, and full-size rollers. Simply fill the built-in container with suitable paint and roll over areas that need attention for a smooth and even finish. Its lightweight, portable design makes it easy to handle, store, and use whenever minor wall imperfections appear. Perfect for bedrooms, hallways, living rooms, offices, and other spaces, it is ideal for covering small marks, scuffs, scratches, and faded areas. Whether you're completing routine home maintenance or preparing your space for guests, this practical paint roller applicator helps make quick wall touch-ups faster, cleaner, easier, and more convenient.



Jellyfish Mist Aroma Diffuser

Transform your space with the Jellyfish Mist Aroma Diffuser with LED Light, a unique decorative and functional accessory designed to create a calming atmosphere. Inspired by the graceful movement of jellyfish, its transparent display section produces a mesmerizing mist effect that adds a touch of elegance and visual appeal to any room. Integrated LED lighting enhances the ambiance, creating a soft and soothing glow that complements bedrooms, living rooms, offices, and relaxation areas. Combining modern design with everyday wellness, this diffuser can help create a peaceful environment while serving as an attractive decorative centerpiece. Its compact and eye-catching design makes it easy to place on desks, bedside tables, shelves, or other surfaces. You're enhancing your home decor, the Jellyfish Mist Aroma Diffuser brings relaxation, style, and tranquil ambiance together in one beautiful accessory.



2-in-1 Calculator with LCD

Simplify your workspace with the 2-in-1 Calculator with LCD Writing Pad and Stylus, a practical desktop tool designed to make calculations, note-taking, and everyday tasks more convenient. Combining a full-function calculator with an erasable LCD writing surface, this versatile device helps you work efficiently without relying on loose sheets of paper. Use the calculator for quick equations, budgeting, shopping calculations, or office tasks, while the writing pad is perfect for jotting down numbers, reminders, notes, or temporary calculations. The clear display, responsive keys, and included stylus provide a smooth and user-friendly experience. Its sleek black design fits neatly into any workspace, making it ideal for students, teachers, offices, retail counters, home use, and small businesses. This multifunctional calculator helps reduce desk clutter while keeping essential calculations and notes in one handy device.

THE NEW PAKISTAN POWERED BY TECHNOLOGY

**AI, 5G, Google,
Semiconductors and
IT Exports Are
Reshaping the Nation's
Digital Future**

Pakistan is entering a defining period in its technological journey. For years, the country's digital transformation was discussed largely in terms of connectivity, mobile phones, software houses and freelancing. Today, the conversation is much bigger. Artificial intelligence, 5G, cloud computing, data infrastructure, semiconductors, digital government and global technology partnerships are rapidly becoming central to Pakistan's economic future. The transformation is no longer simply about bringing more people online. It is about determining what Pakistan can create, export and build in a world where technology is becoming one of the most important drivers of productivity, competitiveness and national development. The arrival of Google's first office in Pakistan, the government's expanding AI initiatives, the launch of 5G spectrum, the establishment of semiconductor education and research clusters and Pakistan's growing presence at international technology events are important signals of this changing landscape. The opportunity is enormous, but so is the challenge.

Artificial intelligence is one of the most significant technological developments influencing Pakistan's economy today. AI is moving rapidly from research laboratories into businesses, classrooms, government departments, financial institutions, healthcare, agriculture, manufacturing and almost every other sector. Pakistan has formally identified AI as a national priority. The Ministry of IT and Telecommunication has described a national programme involving AI education, scholarships, research and mass upskilling. One initiative targets the training of one million non IT professionals, while the government has also launched AI Seekho 2026 to promote practical AI skills and application development.

This shift is important because Pakistan's greatest technology asset is not its hardware. It is its people. With a young

population and an expanding pool of software developers, engineers, freelancers and technology entrepreneurs, Pakistan has the potential to participate in the global AI economy. But potential alone will not be enough. The next stage requires advanced skills in machine learning, data science, cloud computing, cybersecurity, chip design and AI engineering. Universities, businesses and government institutions will need to work together to ensure that young Pakistanis are prepared for an economy where AI becomes an everyday business tool.

AI will also change the nature of employment. Some repetitive tasks will increasingly be automated, while demand will grow for people who can work alongside AI systems, manage data, develop applications and solve complex problems. The question for Pakistan is therefore not whether AI will change the workforce. The more important question is how quickly the workforce can adapt to this transformation and turn technological change into greater productivity, new businesses and higher value employment.

One of the most visible developments of 2026 has been Google's expanded presence in Pakistan. In August, Prime Minister Shehbaz Sharif inaugurated Google's first office in Pakistan, highlighting cooperation in digital transformation, IT infrastructure, youth training and artificial intelligence. The development has significance beyond the opening of an office. It represents deeper engagement between one of the world's largest technology companies and Pakistan's emerging digital economy.

For Pakistan, partnerships with global technology companies can provide access to skills, platforms, knowledge and international networks. For the technology industry, they can also create new pathways for Pakistani developers, entrepreneurs and businesses to participate in global markets. The real measure of success, however, will be what happens beyond the headlines. If international technology partnerships translate into skills, startups, exports, research and investment, their economic impact could extend far beyond the technology sector.

Pakistan's IT and IT enabled services industry has already demonstrated that technology can generate foreign exchange without the traditional limitations associated with physical exports. According to the State Bank of Pakistan, ICT services exports increased by 18.3 percent during



FY2025 to approximately US\$3.8 billion, supported by software consultancy, freelancing and computer and information services.

The numbers demonstrate the growing importance of the digital services sector. Unlike traditional exports, software, consulting, design, cloud services and many digital products can be delivered from Pakistan to customers anywhere in the world. A developer sitting in Lahore, Islamabad, Karachi, Peshawar or Faisalabad can potentially serve a company in Europe, North America or the Middle East.

This creates a unique opportunity. Pakistan does not necessarily need to build a physical factory for every export. It needs talent, reliable connectivity, international payment mechanisms, strong intellectual property protection, competitive taxation and an environment in which technology companies can scale. The State Bank has also introduced measures to facilitate IT companies and freelancers, including reforms aimed at simplifying export receipt procedures and improving the handling of exporters' complaints.

The next challenge is moving from individual freelancing and small software houses toward larger technology companies capable of creating global products, intellectual property and internationally recognised brands. Pakistan's future technology success will increasingly depend on its ability to move from providing services to developing products and solutions that can compete in international markets.

Another major development is the transition toward 5G. Pakistan conducted its spectrum auction for next generation mobile services in March 2026. The Ministry of IT described the development as an important step toward improving connectivity and strengthening the digital economy.

5G is much more than faster mobile internet. Its potential applications include smart manufacturing, connected vehicles, telemedicine, remote education, industrial automation, intelligent logistics, precision agriculture and large scale Internet of Things applications. It can create new possibilities for businesses and public services while changing the way people interact with technology.

But the success of 5G will depend on more than spectrum. Pakistan will need investment in fibre networks, towers, backhaul infrastructure, data centres, cloud services and reliable electricity. Rural con-



nectivity will also remain critical because a digital economy cannot become truly inclusive if advanced services remain concentrated in major cities.

The real promise of 5G will emerge when businesses begin developing applications that use its capabilities rather than simply when consumers receive faster downloads. The technology can become an important platform for innovation if entrepreneurs, universities and industries are able to develop practical applications around it.

Perhaps one of Pakistan's most ambitious technology initiatives is the attempt to develop semiconductor expertise. In August 2026, the Ministry of IT announced that Pakistan's National Semiconductor Education and Research Cluster framework had been completed, with NED University joining NUST and ESUPAK UET Lahore as regional partners. The programme aims to develop more than 7,200 semiconductor professionals by 2030.

Semiconductors are at the heart of modern technology. Smartphones, automobiles, telecommunications equipment, industrial machinery, artificial intelligence systems and advanced aerospace technologies all depend on chips. Pakistan is not entering an easy industry. Semiconductor manufacturing requires enormous capital, highly specialised infrastructure, advanced research and long term industrial planning.

Pakistan does not necessarily need to begin by competing with the world's largest chip manufacturers. A more realistic opportunity may lie in semiconductor design, embedded systems, testing,

research, specialised engineering and the development of a highly skilled workforce. The government's semiconductor human resource programme, with an approved budget of PKR 4.844 billion, is intended to develop that talent base.

The immediate objective is therefore not simply to manufacture chips. It is to create the intellectual and engineering capacity from which a broader semiconductor ecosystem can eventually develop. If sustained investment in education and research is combined with private sector participation, Pakistan could gradually establish capabilities in an industry that will remain strategically important for decades.

As AI expands, another requirement becomes increasingly important: computing power. AI models need enormous quantities of data and processing capacity. Businesses need cloud infrastructure. Governments need secure digital systems. Financial institutions require resilient data platforms. This makes data centres increasingly strategic.

Pakistan's digital future will depend not only on internet access but also on where data is processed, stored and protected. Greater domestic capacity could support cloud computing, AI applications, financial technology, ecommerce and government digital services.

However, data infrastructure also requires reliable electricity, high speed connectivity, cybersecurity and clear regulatory frameworks. The country's technology infrastructure therefore needs to evolve as an integrated ecosystem in which fibre networks, 5G, cloud services, data



centres, cybersecurity and digital platforms develop together.

For decades, Pakistan has been a large consumer market for international technology products. The next ambition is different. Pakistan wants to become a creator and exporter of technology.

That transition is already visible in software services, freelancing, fintech, ecommerce, gaming and emerging AI startups. Pakistan's participation in international events such as LEAP 2026 in Saudi Arabia also reflects an effort to present the country as a technology destination and connect Pakistani companies with international markets.

The Gulf, particularly Saudi Arabia and the United Arab Emirates, offers an important market for Pakistani technology companies. Their rapidly expanding digital economies require software, cybersecurity, AI, cloud services, engineering and specialised technology solutions. For Pakistani companies, proximity to the Gulf provides an opportunity to move beyond traditional outsourcing toward long term partnerships and technology exports.

Pakistan can also benefit from its geographical position between major markets in Asia, the Middle East and Europe. With the right infrastructure and business environment, the country could increasingly position itself as a source of technology talent and digital services for international businesses.

Technology infrastructure can be built relatively quickly, but human capital takes much longer. This may ultimately

be Pakistan's most important technology challenge.

Universities must continuously update curricula. Students need practical exposure rather than only theoretical knowledge. Businesses need to participate in training and research. Government programmes need measurable outcomes. The country also needs greater participation of women in technology, more opportunities outside the largest cities and stronger links between universities and industry.

Pakistan's demographic structure can become a major advantage if its young population receives the skills demanded by the global digital economy. But if education and training fail to keep pace with technological change, the same demographic advantage could become a missed opportunity.

The future technology workforce will need more than conventional computer literacy. Young people will increasingly require skills in artificial intelligence, data science, cybersecurity, cloud computing, software engineering, digital marketing, chip design and advanced communications. Equally important will be creativity, entrepreneurship, problem solving and the ability to work across international markets.

There is another essential ingredient: trust. Digital businesses depend on reliable payments, cybersecurity, data protection, intellectual property, transparent regulation and predictable policies.

As Pakistan expands digital government and online commerce, citizens and

businesses need confidence that their information is secure and that digital systems will remain reliable. The government has already moved toward a broader institutional framework for digital transformation, including the Digital Nation Pakistan agenda and associated digital institutions.

The next phase should focus on implementation, coordination and measurable outcomes. Technology policies must translate into practical improvements for citizens, businesses, students and entrepreneurs. A successful digital economy requires not only technology but also institutions that people can trust.

Pakistan's technology story is no longer simply a story about a few software houses or a growing community of freelancers. It is becoming a story about economic transformation.

Artificial intelligence can change productivity. 5G can transform connectivity. Cloud computing can modernise businesses. Semiconductors can create new engineering capabilities. Data centres can provide the computing foundation for the digital economy. Global companies such as Google can bring knowledge and international connections. IT exports can generate valuable foreign exchange and create new opportunities for young professionals.

But none of these developments guarantees success. Technology rewards countries that combine talent, infrastructure, investment, research, entrepreneurship and consistent policy. Pakistan now has an opportunity to bring these elements together.

The country does not need to become the next Silicon Valley overnight. It needs to identify its strengths, develop world class talent, encourage innovation and connect Pakistani companies to global markets. It needs universities that produce industry ready graduates, businesses that invest in research and development, investors willing to support technology entrepreneurs and policies that encourage innovation and long term investment.

Pakistan's technology revolution is already underway. The next chapter will determine whether the country remains primarily a consumer of global technology or develops the capabilities to become a significant creator, exporter and innovator.

The defining question for Pakistan is no longer whether it will participate in the digital future. The defining question is how boldly and effectively it can build its place in it.



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FROM OCEAN TANKER TO YOUR FUEL TANK: THE JOURNEY OF PETROLEUM IN PAKISTAN

How fuel moves from international markets and Pakistani refineries through ports, terminals, depots and distribution networks to reach millions of vehicles



Every day, millions of Pakistanis visit petrol stations, fill their vehicles and continue their journeys without thinking about where that fuel came from. But behind every litre of petrol or diesel is a sophisticated chain involving international suppliers, ports, terminals, refineries, storage facilities, pipelines, road tankers, railways, oil marketing companies and petrol stations.

The journey begins either with imported crude oil and refined petroleum products or with crude oil processed by Pakistan's domestic refineries. Pakistan remains significantly dependent on imports to meet its petroleum requirements. OGRA has reported that around 80 percent of the country's crude oil and refined petroleum requirements are met through imports, while local refineries supply a substantial portion of domestic demand. Petrol and diesel remain the principal transportation fuels.

For imported fuel, the journey begins at Pakistan's ports. Keamari and Port Qasim are important gateways for crude oil and refined petroleum products. From these locations, products are transferred to storage and terminal facilities operated by refineries and oil marketing companies. These facilities provide the essential link between international shipments and the domestic fuel market.

The next stage is refining. Crude oil is processed in refineries into various petroleum products, including petrol, diesel and other fuels. Pakistan has been working toward modernization of its refining sector to improve efficiency and fuel quality. The

ability to refine more petroleum domestically is important because it can strengthen supply security and reduce reliance on imported finished products.

After refining or importation, fuel enters the storage network. Storage is one of the least visible but most important parts of the petroleum system. Large quantities of petrol and diesel must be stored safely so that supplies can continue reaching consumers even when there are delays in imports, transportation challenges or unexpected increases in demand.

From terminals and storage facilities, petroleum products move toward regional depots and distribution points. This movement takes place through several modes, including pipelines, road tankers and, to a more limited extent, railway tank wagons. The distribution network extends from Karachi to major urban centres and remote parts of the country.

Oil marketing companies are at the heart of this distribution process. They coordinate fuel procurement, storage, transportation and delivery to thousands of retail outlets. Pakistan State Oil, for example, reports a network of more than 3,500 retail outlets, 23 depots and nine installations across the country.

Quality control is required throughout the journey. Fuel is tested at different points to ensure that it meets applicable specifications. At the retail level, dispensing equipment also needs appropriate maintenance and calibration so that consumers receive the correct quantity. OGRA regulates important aspects of the downstream oil sector, including licensing, quality monitoring and handling of sector-related complaints.

Safety is equally important. Petroleum products are highly flammable, so every stage requires appropriate engineering standards, operating procedures, fire pro-

tection and emergency preparedness. A modern fuel supply chain is therefore not simply a logistics operation; it is also a national safety system.

Technology is now becoming increasingly important. Digital inventory management, automated monitoring, GPS-enabled transportation, electronic documentation and real-time supply-chain information can improve visibility and help companies and regulators respond more quickly to changes in demand or supply. In September 2026, the Petroleum Division was also reviewing supply-chain, transportation and logistics arrangements to help maintain uninterrupted fuel availability across Pakistan.

What appears to be a simple transaction at a petrol pump is actually the final stage of a nationwide energy network. Keeping that network reliable requires investment, regulation, safety, quality control, adequate storage and efficient logistics.

Pakistan's economic activity depends heavily on this system. Transport, agriculture, industry, aviation, commerce and everyday mobility all depend on reliable fuel supplies. Strengthening every link from international supply and domestic refining to distribution and retail is therefore essential for energy security, economic resilience and public confidence.

The next time you fill your vehicle, remember that the fuel in your tank has completed a remarkable journey. From an overseas tanker or a Pakistani refinery to a storage terminal, depot and finally the petrol station, every litre represents a coordinated national supply chain keeping Pakistan moving.

SAUDI ARABIA'S ELECTRIC CAR: XUBOT, 670 KM IN 30 MINUTE CHARGING AND LESSONS FOR PAKISTAN



CH. SHER BAHADUR
EX. PCS/ PMS

Saudi Arabia has long been known for its oil wealth and its role as a major energy producer. Now the kingdom has taken a different kind of step by introducing its first electric vehicle made inside the country. The vehicle comes from a Saudi company called Ceer. It has been named Exobot. It will be available as a sedan and as a sport utility vehicle, commonly called an SUV. These vehicles have doors that open upward. Such doors are usual-



SAUDI ARABIA HAS LAUNCHED ITS FIRST LOCALLY MADE ELECTRIC VEHICLE, EXOBOT, AS PART OF ITS STRATEGY TO DIVERSIFY BEYOND OIL AND BUILD A MODERN AUTOMOBILE INDUSTRY. THE DEVELOPMENT OFFERS LESSONS FOR PAKISTAN, ESPECIALLY IN ELECTRIC MOBILITY, INVESTMENT, TECHNOLOGY TRANSFER, MANUFACTURING AND ENERGY INDEPENDENCE.

ly called gull wing doors. This design choice gives the cars a striking look and separates them from many ordinary models on the road.

Jim De Luca, the chief executive officer of Ceer, has said the company has also removed the traditional pillars that normally sit between the front and rear sections of a car. Instead of relying on those pillars, the company has used new and very strong materials to keep the vehicle structure safe and rigid. This is not just a styling decision. It is also an engineering decision that shows how electric vehicle design can move in new directions when companies are willing to rethink old rules. The goal is to keep strength, safety and style together while creating something that feels modern and distinct.

This move into electric vehicles is part of a larger Saudi plan. The kingdom wants to reduce its economic dependence on oil and move toward modern industrial sectors. It also wants to build a strong local automobile industry. The Saudi Press Agency has said that Saudi strategy aims to strengthen its position in the global automobile industry. This development is seen as an important milestone. Crown Prince Mohammed bin Salman has said that the launch of Ceer's first electric vehicle is a significant step in building a sustainable and advanced industrial system in the kingdom. He also said that the country is promoting investment, empowering national talent and strengthening the private sector so that the automobile industry can become a key pillar of economic growth. The aim is for Saudi Arabia to become a leading regional and global center in this field.

What are the technical features of the



Exobot? According to details released by Ceer, the Exobot sedan can travel up to 670 kilometers on a single charge. Its battery can be charged from 10 to 80 percent in only 30 minutes. The company has also released details about the SUV version. The Exobot SUV can travel up to 560 kilometers on a full charge. Its battery can also be charged from 10 to 80 percent in just 30 minutes. The SUV can reach 100 kilometers per hour from a standstill in 2.9 seconds. It produces 850 horsepower. The Saudi Press Agency has said that the design of the Exobot sedan and SUV reflects Saudi Arabia's natural landscapes and cultural identity. The vehicles were designed and engineered in Saudi Arabia and built to international standards.

Ceer does not plan to stop at two electric vehicles. The company has announced that it will introduce five more models by 2030. Company officials expect sales of the new vehicles to begin in the Saudi market in early 2027. Ceer says these models are not only equipped with advanced technology but were also developed with the region's climate and geography in mind. Reuters has reported that Ceer intends to enter markets in the Middle East and North Africa in 2028. Reuters also notes that Saudi Arabia had started several local vehicle manufacturing plans in the past. More than a decade ago, a proposal to set up a Jaguar Land Rover plant in Saudi Arabia was put forward, but it did not become a reality. Similarly, in 2019, the Japanese company Toyota refused to sign an agreement to manufacture vehicles in Saudi Arabia. A major reason was the lack of local suppliers and the high cost of labor.

This time Ceer has adopted a different strategy. The company is not only seeking help from global partners but is also working to build a wide network of local suppliers. Reuters says Ceer's plan comes at a time when the global automobile industry is going through a major change. Chinese automakers are rapidly increasing their market share, while traditional European, Japanese and American companies are facing tough competition. China has gained a clear lead, especially in the electric vehicle sector. In addition, several global auto parts companies have already invested in Saudi Arabia. These include the American company Lear, the South Korean company Shin Young, the German company Benteler and the Chinese company Fangxin. Incentives and facilities provided by the Saudi government have encouraged these companies to set up local factories.

Now the question is what impact this Saudi step can have on Pakistan. Pakistan and Saudi Arabia have ties that go far beyond oil and energy. There is great potential for cooperation between the two countries in trade, investment and technology. Pakistan's electric vehicle industry is still in its early stages, but the government has taken several important steps to promote the sector. Prime Minister Shehbaz Sharif recently approved major tax concessions for new energy vehicles. Under these measures, the sales tax on electric vehicles will be only one percent. Federal excise duty, capital value tax and withholding tax will be fully exempt. In addition, the loan limit for electric vehicles has been raised from 3 million rupees to 10 million rupees, and the repayment period has been extended from three years to five years. The government aims to make electric vehicles 30 percent of all new vehicle sales by 2030.

Saudi progress in the electric vehicle industry matters to Pakistan for several reasons. First, Pakistan imports oil from Saudi Arabia and other Gulf countries. If Saudi Arabia itself is moving toward electric vehicles, it sends a signal that Pakistan also needs to diversify its energy needs. In 2024, Pakistan spent more than 16 billion dollars on oil imports. The transport sector accounted for 79 percent of that. If Pakistan shifts toward electric vehicles, it can reduce its dependence on oil imports and save foreign exchange. This would help the economy and improve energy security over time.

Second, Saudi companies could invest in Pakistan. Ceer's success shows that the electric vehicle industry can be promoted in the Middle East. Chinese company BYD has already announced that it will start assembling electric vehicles in Pakistan. If Saudi companies also invest in Pakistan, it could boost the local industry and create jobs. Pakistan and Saudi Arabia can work together in chip manufacturing, lithium batteries and electric vehicle production. Such cooperation could help Pakistan build a stronger industrial base and reduce its reliance on imported finished vehicles.

Third, Saudi progress in electric vehicles could help Pakistan through technology transfer. Pakistan has a skilled workforce. If Saudi companies include Pakistan in their supply chains, local industry could gain access to advanced technology. Pakistan also needs more electric vehicle charging stations. Saudi experience could help in this area as well. Building a reliable charging network is essential if electric ve-



hicles are to become practical for ordinary people. Without charging infrastructure, even good policies will not be enough.

At the same time, there are challenges. Electric vehicles in Pakistan are still expensive. Charging infrastructure is limited. Electricity supply problems also need to be solved because stable power is a basic requirement for electric vehicle growth. The government should promote local manufacturing of parts so that prices can come down and the industry can become sustainable. Policy makers should also focus on training workers, supporting local suppliers and encouraging research and development. These steps will take time, but they are necessary.

The launch of Saudi Arabia's first electric vehicle, the Exobot, is a sign of a larger economic and industrial change. It is not only important for Saudi Arabia. It is also an opportunity for countries like Pakistan to rethink their own economies and move toward new technology sectors. Pakistan should learn from the Saudi experience and take practical steps to promote its electric vehicle industry. If it does so, it can move toward greater self reliance in energy, reduce its oil import bill and build a stronger foundation for long term economic growth.

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EVERY VOICE DESERVES A WAY TO COMMUNICATE: THE ROLE OF AAC IN SPEECH- LANGUAGE PATHOLOGY

When Speech Is Not the Only Way to Communicate

Communication is much more than spoken words. A smile, gesture, picture, written message, sign, or button pressed on a communication device can all carry meaning. For individuals who cannot rely on speech to communicate effectively, Augmentative and Alternative Communication (AAC) can provide another pathway to express themselves.

AAC includes a wide range of communication methods. These may be as simple as gestures, signs, photographs, or picture boards, or as sophisticated as speech-generating devices and tablet-based communication systems. According to the American Speech-Language-Hearing Association (ASHA, n.d.), AAC may supplement existing speech or serve as an alternative when speech is absent or not functional.

For a speech-language pathologist, AAC is not simply a device. It is a way of giving a person greater access to communication.

AAC Is More Than a Communication Device

When people hear the term AAC, they sometimes immediately think of an electronic tablet. In reality, AAC can take many forms. A child may point to a picture of a cup to request a drink, use a communication board to answer a question, select symbols on a tablet, or combine gestures and spoken words.

The most appropriate system depends on the individual. ASHA recommends considering communication abilities, motor skills, vision, hearing, language, literacy, sensory needs, and the environments in which the person needs to communicate (ASHA, n.d.).

This means there is no single AAC system that is right for everyone.

Who Can Benefit From AAC?

AAC can be considered for people with a wide variety of communication difficulties. Children with autism, cerebral palsy, intellectual disability, developmental language difficulties, childhood apraxia of speech, and genetic conditions may benefit from AAC. Adults with aphasia, acquired apraxia, neurological conditions, or communication difficulties following illness or injury may also require AAC support.

AAC IS MORE THAN A DEVICE OR REPLACEMENT FOR SPEECH. IT PROVIDES INDIVIDUALS WITH MEANINGFUL WAYS TO EXPRESS NEEDS, THOUGHTS, FEELINGS, AND IDEAS, SUPPORTING INDEPENDENCE, PARTICIPATION, SOCIAL CONNECTION, AND A STRONGER VOICE IN EVERYDAY LIFE.

Importantly, AAC is not only for people who have no speech. Someone may have some spoken language but still struggle to communicate effectively in certain situations. In these cases, AAC can supplement speech and provide additional support when speech is difficult to understand or insufficient for expressing a more complex message (ASHA, n.d.).

Will AAC Stop a Child From Talking?

This is one of the most common concerns families have.

Research does not support the idea that introducing AAC automatically prevents children from developing speech. Schlosser and Wendt (2008), in a systematic review, found that AAC interventions did not impede speech production in children with autism; several studies reported increases in speech production, although the gains were generally modest. More recent research has continued to examine the relationship between AAC and speech development. White et al. (2021), in a systematic review of individuals with autism, reported overall improvements in speech production associated with AAC, while noting that speech gains did not exceed the communication benefits provided through AAC itself.

The message for families is reassuring: AAC does not have to mean “giving up on speech.” Instead, it can provide a reliable communication system while spoken language continues to develop when possible.

AAC Can Give Children More Than Requests

Communication is not only about saying “I want juice” or “give me the ball.”

Children also need to say “look,” “I don’t like it,” “come here,” “that’s funny,” “where is Mum?” and “I did it!” They need opportunities to comment, protest, ask questions, greet people, share experiences, and participate in conversations.

Research on AAC has increasingly highlighted communication functions beyond simple requesting. Ganz et al. (2017) found evidence that aided AAC interventions can support a broader range of social-communication functions, although the researchers also identified limitations in the existing evidence regarding maintenance and generalization.

This is why an effective AAC program should not teach only isolated requests. It should help the person become a more independent and socially engaged communicator.

The SLP’s Role

Speech-language pathologists play an important role in AAC assessment and intervention. The SLP considers how the individual currently communicates, what they understand, what they want to communicate, and what barriers are preventing successful communication.

The therapist may then work with the individual, family, teachers, caregivers, and other professionals to select and implement an appropriate communication system.

One particularly useful strategy is aided language modeling, in which the communication partner speaks while simultaneously pointing to symbols on the AAC system. ASHA identifies augmented input, also called aided language stimulation or aided language modeling, as an approach that can support symbol comprehension and production (ASHA, n.d.).

For example, while saying “Let’s go outside,” the communication partner may select the symbols for “go” and “outside.” The child is therefore not simply being asked to use AAC; they are being shown how communication works.

Communication Should Happen Everywhere

AAC should not remain inside the therapy room.

A communication system becomes meaningful when it is available during real-life activities—at home, at school, in the playground, during meals, while shopping,



and when spending time with family and friends. Consistent use across environments can support functional communication and generalization (ASHA, n.d.).

Parents and teachers therefore have an important role. They can model symbols, wait for communication attempts, respond to messages, and create genuine opportunities for the individual to communicate.

Every Communication Attempt Matters

For many individuals, AAC is not about replacing their voice. It is about making sure they have a voice that can be understood.

A picture, gesture, sign, communication board, or speech-generating device can open a door to independence. It can allow a child to make a choice, tell a parent what hurts, join a classroom activity, make a joke, or simply say “no.”

As speech-language pathologists, our responsibility is to look beyond the question, “Can this person speak?” and ask a more important question: “Does this person have an effective way to communicate?”

Every person deserves the opportunity to express wants, needs, thoughts, feelings, and ideas. Sometimes that communication comes through speech. Sometimes it comes through signs, pictures, gestures, writing, technology—or a combination of all of them.

Because communication is not limited to one voice, one method, or one device.

Every voice deserves a way to be heard.

COTTON REVIVAL SIGNALS HOPE FOR PAKISTAN'S TEXTILE ECONOMY

PAKISTAN'S COTTON SECTOR IS SHOWING A PROMISING START, WITH SHARPLY HIGHER ARRIVALS, FIRMER PRICES AND FAVOURABLE WEATHER SUPPORTING EXPECTATIONS OF IMPROVED PRODUCTION. HOWEVER, DECLINING LONG-TERM OUTPUT, PEST RESISTANCE AND RISING BRAZILIAN COTTON IMPORTS REMAIN SERIOUS CHALLENGES THAT COULD LIMIT THE SECTOR'S RECOVERY.

Pakistan's cotton sector has begun the new season with genuinely encouraging momentum. Arrivals at ginning factories have surged by 77.3 percent compared with the same period last year, prices have firmed across Punjab and Sindh, and favourable weather has raised hopes that production and quality could prove the best seen in eight to 10 years. This strong start gives growers, ginners, traders and textile mills a welcome chance to rebuild confidence after several difficult seasons. The latest data shows 527,900 bales had reached ginning factories by July 15, up from 297,751 bales a year earlier, an increase of 230,149 bales. Punjab recorded 201,497 bales against 145,101 bales last year, up 38.87 percent. Sindh posted an even stronger performance, with arrivals rising to 326,403 bales from 152,650 bales, up 113.82 percent. Sanghar remained the leading district with 280,393 bales, while Hyderabad, Mirpurkhas, Jamshoro and Nawabshah also recorded significant gains. By the end of August, arrivals had risen 27.01 percent

year on year to 1.696 million bales, with Sindh climbing 30.95 percent to 1.139 million bales and Punjab up 19.66 percent to 557,097 bales.

The price trend has also been firm. As of early August, cotton prices across Pakistan continued their upward march, with rates climbing by Rs500 per maund as the market held steady amid changing supply and demand conditions. According to Ehsanul Haq, chairman of the Exchange Ginners Forum, the price of cotton in Punjab has risen to Rs19,300 per maund, while rates in Sindh have reached Rs18,400 per maund. This latest increase highlights the continued volatility in the domestic market, where prices have been fluctuating in response to trading activity and the availability of quality cotton. Ginners and traders are closely monitoring the situation, as movements in Punjab and Sindh have a direct impact on the wider textile and agricultural sectors. The textile industry, one of Pakistan's major economic sectors, relies heavily on a steady supply of locally produced cotton, and any significant change in availability or buying trends could lead to further movement in rates, adding to uncertainty for growers, ginners, traders and textile manufacturers.

The price strength comes despite a mixed production picture. The Pakistan Cotton Ginners Association released its final arrivals report on 28 February 2026, indicating a slight year on year increase in national production. Total cotton arrivals reached 5.60 million bales in 2025/26,

compared with 5.52 million bales in 2024/25. A province wise comparison shows mixed trends. In Punjab, arrivals experienced a minor decline, decreasing from 2.71 million bales to 2.69 million bales. In contrast, Sindh registered a noticeable increase, with arrivals rising from 2.81 million bales to 2.91 million bales during the same period. The data also showed that 177,600 bales were sold to exporters, with Sindh accounting for 138,400 of those bales, while sales to textile mills totaled over 5.18 million bales.

Despite the encouraging start, the domestic market faces a significant challenge from imported cotton. Lower Brazilian cotton prices have reportedly encouraged some Pakistani textile mills to increase imports from Brazil, adding another challenge for the domestic market. The numbers are striking. Pakistan's cotton imports from Brazil surged 110 percent in 2026, with its share of Brazil's raw cotton exports more than doubling from 7.8 percent to 17.5 percent year to date. In June alone, Pakistan accounted for about 20 percent of Brazilian cotton exports, with purchases of approximately 43,400 tonnes, a volume 82 percent higher than the same month last year. Brazilian cotton exports set a monthly record in May 2026, with 291,200 tonnes shipped. Bangladesh emerged as the largest destination with 21.1 percent of shipments, followed by Pakistan with 19.0 percent, ahead of Turkey at 14.2 percent and Vietnam at 13.4 percent. Combined, Bangladesh and Pakistan represented about 40 percent of May exports, underscoring the central role of South Asian

spinning hubs in recent trade flows. This shift toward imports reflects the persistent gap between domestic production and the needs of Pakistan's textile industry.

The production shortfall is part of a longer term decline. Cotton output has dropped from around 14 million bales at its peak to an estimated 6.85 million bales in 2025/26, which is 34 percent below the government's own target of 10 million bales. The International Cotton Advisory Committee estimates Pakistan's output at 1.15 million tonnes in 2025/26, a decline of 4 percent, and projects a further fall to 1.10 million tonnes in 2026/27, expanding reliance on raw cotton imports. The USDA has forecast Pakistan's 2026/27 cotton production at 5.05 million 480 pound bales, approximately 3 percent lower than the 2025/26 season, with harvested area lowered to 1.85 million hectares primarily due to a decline in Punjab province driven in part by lower cotton profitability relative to alternative crops. Yield is expected to decline 22 kilograms per hectare to 555 kilograms in 2026/27, a 4 percent drop.

Despite these concerns, both analysts saw considerable potential in the crop. Mr Haq attributed the improvement largely to relatively favourable weather conditions this season and said production and quality could prove the best seen in eight to 10 years. He expected that national production could exceed 6 million bales this season and highlighted a major discrepancy in official production estimates. Mr Mahmood, while avoiding an early production estimate, said the crop's final outcome would

largely depend on how effectively growers manage pink bollworm and weather risks in the coming weeks. His caution is well founded. Recent studies indicate that pink bollworm populations in Pakistan may not be encountering effective toxin concentrations and may be exhibiting field evolved resistance to Bt cotton toxins. High levels of infestation in flowers and bolls, as well as extensive seed damage and cotton seed yield loss, were observed in tested varieties. Only one Bt cultivar producing Cry1Ac plus Cry2Ab showed a significant reduction in pink bollworm infestation and protection from seed damage, although it was not entirely impervious to attack. These conditions indicate that immediate action is needed to manage this important global pest of cotton.

The broader global context also matters. Global cotton production is projected to reach 26.2 million tonnes in the 2026/27 season, marginally outpacing estimated consumption of 25.9 million tonnes. However, early season production risks including weather volatility and pest pressures

could narrow that buffer as the crop progresses. The ICAC forecasts the 2026/27 Cotlook A Index price to range between 62 and 99 cents per pound, with a midpoint of 78 cents per pound. Pakistani cotton prices increased from 78 to 80 cents per pound or from 17,800 to 18,300 PKR per maund in August, with the PKR holding near 278 PKR per USD. The global stocks to use ratio is projected to be 56.7 percent in 2026/27, which would be the lowest since 2010/11. For Pakistan, the challenge is to capitalize on favorable weather and improved arrivals while managing the twin threats of pest infestation and import competition. The PCGA figures suggest the crop has made a considerably stronger start than last year, but experts cautioned that the final production picture will only become clearer after the picking and ginning season ends. For now, the market remains firm, the ginners are watchful, and the coming weeks will determine whether this season fulfills its early promise or falls victim to the familiar pressures that have held Pakistan's cotton sector back for years. ■





ENGR. FAIZ BHUTTA
BABA-E-SOLAR

GRID FORMING – A MYTH OR REALITY OR FUTURE OF POWER SYSTEMS

Grid Forming solutions are fundamentally different from conventional power systems or some of the claims are market driven. Why the Grid Forming emerged popular now. The major reasons are high penetration of solar and wind, reduction in synchronous generators, lower system inertia, weak grids, frequency stability challenges and black start requirements.

Grid following inverters also took its evolutionary time and it is now a mature technology and datasheets and technical material are mostly standardized by reputed manufacturers of Grid Following Inverters but Grid Forming technology is new and it will take its evolutionary growth time and datasheets and technical materials are not standardized and they will be standardized with time. Not a single datasheet of Grid Forming by its manufacturers mentions all the features and



GRID FORMING BESS IS AN IMPORTANT ADVANCEMENT FOR PAKISTAN'S EVOLVING ENERGY LANDSCAPE, BUT IT IS NOT A MAGIC SOLUTION. EFFECTIVE DEPLOYMENT REQUIRES TRANSPARENT SPECIFICATIONS, INDEPENDENT TECHNICAL ASSESSMENT, PROPER SYSTEM INTEGRATION, PROTECTION, AND COMMISSIONING. SOUND ENGINEERING, RATHER THAN MARKETING CLAIMS, SHOULD DETERMINE WHEN GRID FORMING TECHNOLOGY IS TRULY REQUIRED.

specifications of Grid Forming. Grid Following as its name is clear that it follows the grid reference frequency, voltage, current and phase angle of the Grid and cannot establish its grid voltage by itself. While Grid Forming creates its own voltage waveform, sets voltage magnitude and frequency, controls phase angle and other inverters synchronize to it.

Manufacturers claim that Grid forming provides synthetic inertia, black start, islanding, grid support, voltage source generation, seamless transition, harmonics suppression, renewable power smoothing etc and in their datasheets such features are not mentioned and if we ask questions from manufacturers, they submit white papers and heavy documents to read and understand by yourself because of the reasons Grid Forming is not merely a software but it includes hardware, digital signal processors, protection coordination, battery response and ro-

bust control algorithms and very complex architectures containing both hardware and software. Not every Grid Forming PCS behaves identically because of different algorithms like droop control, VSG, Machine control, dispatchable virtual oscillator, VOC, Proprietary methods and each Grid Forming PCS behaves differently. I asked once a product manager three questions, what is the response time of your PCS, what is seamless transfer time and what is ramp rate and he said that all in milliseconds and you do not worry. Then I asked him to provide specific values, he did not answer well. This is a common reply we get from representatives of manufacturers and same sentences we used to hear when solar started in Pakistan in 2008. Grid Forming is not a magic solution. It cannot solve undersized batteries, poor protection design, communication failures, weak transformers, bad grounding and poor commissioning. Some suppliers of Hybrid inverters and batteries are also creating confusions by giving the name of Hybrid



Inverter solutions as Battery Energy Storage Systems and they mislead by giving statement that Grid following is not different than grid forming.

Some marketing material exaggerates the Grid Forming functions and features to attract the clients and then after supply and installations, they cannot prove what they say. There is a need to get the technical materials and study them before planning any BESS. There is also a need to create a pressure on the manufacturers to include Grid Forming features and timing of transfer, switching, ramp rate and black start time. When I ask questions of Transfer time, Ramp rate, Seamless transfer time, back start time of PCS, variable replies come from the manufacturers and a person get confused. Some say our PCS is fully Grid Forming and some say that it is VGS controlled and one get confused and when they provide heavy technical materials, we do not have much time to study them and finally we have to believe on their claims which are not true and sometimes true also.

Now question is that do Pakistani industrial facilities need Grid Forming BESS. Answer will be YES because trans-

mission network is very vast and feeders are weak in industrial areas, rooftop solar penetration is very high and increasing day by day. Wind power is also there and both solar and wind are variable sources. Pakistani commercial and Industrial facilities need battery energy storage systems with Grid forming features to solve issues like storage of surplus energy from installed solar and using in during peak tariff times, voltage fluctuations, frequency changes, harmonics control, reduction of demand charges which not only solves their grid stability issues but also reduction in levelized cost of energy. Pakistani DISCOs and NGC (National grid Company) also need to install BESS at transmission and receiving ends to prevent reverse flows, voltage swell, unstable frequency issues, Losses and congestion management and this will be a win-win situation for all commercial, industrial facilities and grid operators.

Grid forming is neither a myth nor a miracle. It is genuine engineering advancement that addresses real challenges in modern power systems. However not every application requires grid forming and not every product marketed as Grid Forming

delivers identical capabilities. The success of BESS depends not only on control philosophies but also on proper engineering, protection, system integration and operational objectives. Sound engineering but not marketing, should determine when Grid Forming is the right choice.

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ABOUT AUTHOR BACKGROUND

With a career built on professional expertise, practical training, and a commitment to advancing renewable energy, Engr. Faiz Bhutta continues to play a significant role in strengthening Pakistan's solar and energy sector. Through professional consultancy, international BESS certification, and the training of thousands of industry professionals, the journey reflects a sustained commitment to knowledge, innovation, and a cleaner energy future. Solar Industry has given him a title of Baba-e-Solar. For professional advice, training, consultancy, and certification opportunities, visit www.tecbpk.org or contact faiz.bhutta@gmail.com.

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PAKISTAN'S LSM SECTOR GROWS 3.03% IN THE FIRST MONTH OF FY27

PAKISTAN'S LARGE-SCALE MANUFACTURING SECTOR GREW 3.03% YEAR-ON-YEAR IN JULY 2026, SIGNALLING MODEST RECOVERY, BUT PERFORMANCE REMAINS UNEVEN. STRONG AUTOMOBILE AND GARMENT PRODUCTION CONTRASTS WITH DECLINES IN TEXTILES, PHARMACEUTICALS, FOOD, CHEMICALS AND STEEL, HIGHLIGHTING PERSISTENT STRUCTURAL CHALLENGES AND FRAGILE INDUSTRIAL MOMENTUM.

The Large Scale Manufacturing sector in Pakistan has started the new fiscal year with a mixed performance that reveals both encouraging signs of recovery and troubling underlying weaknesses. According to data released by the Pakistan Bureau of Statistics, the LSM sector recorded a modest year on year growth of 3.03% in July the first month of the fiscal year 2026-27. On a month to month basis the growth was much sharper at 9.5% compared to June. This rebound comes after industrial activity had contracted by 3.48% in June raising questions about whether the recovery is sustainable or simply a temporary correction after a weak previous month.

The Quantum Index of Manufacturing which measures the output of the country's large scale industries stood at 119.13 in July compared to 115.62 in the same month last year. The index provides a snapshot of how factories and industrial units across the country are performing and the increase suggests that production levels have improved. However the headline number masks significant variation across different sectors with some industries surging ahead while others continue to struggle.

For the full fiscal year 2025-26 the LSM sector had posted a year on year growth of 4.98%. That full year improvement indicated that industrial production had regained some ground after previous periods of stagnation. Yet the monthly data shows that growth remains uneven and prone to fluctuations. The July figures for the new fiscal year reflect that same pattern of inconsistent performance.

Several industries contributed positively to the overall growth in July. The tobacco sector added 0.55% points to the total. Garments contributed 3.87% points which is a significant share. Petroleum products added 0.11% points while cement contributed 0.36% points. Electrical equipment added 0.21% points and automobiles contributed 1.91% points. Other transport equipment added 0.27% points and furniture contributed 0.18% points. These positive contributions helped lift the overall index despite weakness in other areas.

But the recovery was far from broad based. A number of important sectors dragged down the overall growth. The food group was a major negative contributor subtracting 0.45% points. Beverages also subtracted 0.45% points. Textiles which is a critical sector for Pakistan's economy subtracted 0.53% points. Chemicals pulled down growth by 0.50% points. Pharmaceuticals were a significant drag subtracting 1.24% points. Iron and steel products subtracted 0.47% points and machinery and equipment subtracted 0.03% points. The fact that so many key industries posted negative contributions suggests that the industrial recovery is fragile and concentrated in a relatively small group of sectors.

The weakness in textiles is particularly concerning given the sector's enormous weight in Pakistan's manufacturing base and its role as the country's largest export earner. When textiles struggle it has ripple effects across the entire economy affecting employment in mills and factories as well as the livelihoods of millions of workers. The negative contributions from pharmaceuticals, chemicals and iron and steel further highlight that the momentum behind the headline growth number is not as strong as it might appear at first glance.

Looking more closely at specific sectors the food group dipped 6.39% year on year in July. Within this category wheat and rice milling declined by 0.99%. Cooking oil and vegetable ghee production fell sharply with declines of 19.22% and 11.81% respectively. One bright spot was

tea blended production which grew by 0.52%. The decline in cooking oil and vegetable ghee is significant because these are essential consumer goods and their reduced production may indicate weaker domestic demand or supply side constraints.

The textile sector as a whole shrank 3.09% year on year in July. However there were mixed results within the sector. Cotton yarn production rose 2.73% while cotton cloth fell 0.09%. These two products account for more than 80% of the textile sector so their combined performance largely determines the sector's overall trajectory. Garment exports grew 22.03% year on year in the first month of the fiscal year which is a positive sign for the export oriented part of the industry.

The coke and petroleum products sector rose 1.34% in the first month of fiscal year 2027. Most petroleum products posted positive production growth with petrol rising 11.56% and kerosene jumping 43.10%. LPG production rose 9.86%. However high speed diesel declined 7.26% and furnace oil output dipped 13.28% year on year. The mixed performance in petroleum products reflects the complex dynamics of energy demand in the country with some products seeing strong growth while others decline.

The automobile sector was a standout performer growing 57.01% year on year in the first month of the fiscal year. This growth was mainly driven by a 57.19% surge in jeeps and cars. Trucks rose 94.35% and light commercial vehicles increased 12.54%. However bus production declined 3.85%. The strong growth in automobiles suggests that consumer demand for vehicles remains robust despite broader economic challenges.

Pharmaceutical production dipped 20.79% which is a substantial decline. Fertiliser production fell 4.71%. Iron and steel production declined 11.40% in the first month of the fiscal year. On the positive side rubber products production rose 1.75% non metallic minerals grew 4.25% and electrical equipment increased 7.88%.

The overall picture that emerges from the July data is one of an industrial sector that is recovering but doing so in an uneven and fragile manner. The headline growth of 3.03% year on year is positive but it is driven by a handful of strong performers like automobiles and garments while many other sectors continue to contract. The weakness in textiles, pharmaceuticals, chemicals and iron and steel is particularly worrying because these are sectors that

employ large numbers of workers and contribute significantly to exports and domestic supply chains.

The month on month growth of 9.5% looks impressive but it comes after a contraction in June so some of this rebound may simply reflect a return to normal levels rather than a genuine acceleration of industrial activity. The fact that growth remains so uneven suggests that structural issues in the industrial sector have not been resolved. These issues include high energy costs, unreliable power supply, difficulties in accessing raw materials and broader macroeconomic challenges that affect business confidence and investment.

The government will need to pay close attention to the sectors that are struggling. Textiles, for example, require consistent policy support to remain competitive in international markets. Pharmaceuticals need a stable regulatory environment and access to affordable inputs. The food processing sector needs reliable supplies of agricultural raw materials. Without addressing these sector specific challenges, the overall LSM growth rate may remain volatile and susceptible to sharp swings from month to month.

Looking ahead, the challenge for Pakistan's industrial sector is to build on the positive momentum in automobiles, garments and a few other industries while addressing the persistent weakness in textiles, food processing and pharmaceuticals. The full year growth of 4.98% in fiscal year 2026 shows that the sector can expand when conditions are favorable. But the monthly fluctuations also show that this expansion is not guaranteed and can be easily derailed by internal or external shocks.

The data for July 2026 provides a snapshot of an economy that is trying to find its footing. The industrial sector is not in crisis but it is also not firing on all cylinders. The mixed performance across sectors suggests that policymakers need to adopt a targeted approach helping the industries that are struggling while sustaining the momentum in those that are performing well. Only then can Pakistan hope to achieve consistent and broad based industrial growth that creates jobs, raises incomes and supports the overall development of the economy. The coming months will reveal whether the July rebound was a sign of things to come or simply a temporary blip in a longer story of uneven and uncertain industrial recovery.





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LNG DISRUPTION FOR PAKISTAN, RISING COSTS AND THE PUSH FOR SELF-RELIANCE

The closure of the Strait of Hormuz did not just choke a narrow waterway. It cut the lifeline of an energy system that Pakistan had spent a decade building around imported gas. When the conflict involving Israel, the United States and Iran escalated in February 2026, shipping through the Strait slowed to a crawl. For Pakistan, the consequences were immediate and severe. Qatar and the UAE together supply about 99 percent of the country's liquefied natural gas, and LNG accounts for roughly 30 percent of total gas supply, according to the Gastech Conferences report, The Outlook for Gas and LNG Markets in Asia, released at its 54th annual event in Bangkok. That gas does not just light homes. It feeds power plants, fertiliser factories and industrial units. When the cargoes stopped arriving, the entire chain began to shudder.

The numbers tell the story of a country caught on the wrong side of geography. In 2025, Pakistan imported around 6.64 million metric tonnes of LNG from Qatar alone, almost all of it routed through the Strait of Hormuz. Between eight and 12 shipments arrived every month through 2025 and into early 2026, with 12 cargoes landing in January alone. In March, the month the war began, only two arrived. By mid-March, those two cargoes cost \$12.49 per MMBtu. Officials warned of near-zero LNG availability in the coming months. Planned power cuts were being prepared for the summer. The Gastech report noted that price volatility and shipping uncertainty were likely to sharply increase power costs, a warning that quickly became reality.

What makes Pakistan's position particularly precarious is how quickly its fortunes reversed. Just a year earlier, the country was grappling with an LNG surplus. Demand had been falling for three

straight years, from 8.2 million tonnes in 2021 to 6.1 million tonnes by late 2025. The government quietly sold excess shipments to other countries and shut down domestic gas wells to prevent pipelines from bursting under the pressure of oversupply. Long-term contracts signed with Qatar, Eni and Socar had become a liability as Brent-linked formulas sent import bills soaring in rupee terms. Pakistan LNG Limited was already renegotiating delivery schedules, deferring cargoes planned for 2026. Then the war turned a surplus problem into an emergency. The very contracts that had once seemed burdensome became impossible to fulfil because the ships could not sail.

The Gastech report pointed out that the Middle East's fluid landscape had redrawn global energy maps in real time and further highlighted the geopolitical sensitivity of gas and LNG markets. For Asian economies, the message was clear. Beyond addressing immediate challenges, policymakers would need to review how to future-proof domestic energy and power systems with a renewed focus on energy security. The report suggested accelerating renewables such as swift-build, utility-scale solar, wind farms and commercial rooftop solar, plus storage deployment. It also recommended speeding up investment in long-term infrastructure, including gas storage, updating power generation mixes and giving gas plants better flexibility.

Pakistan's government has already begun to pivot. The Gastech report noted that gas supply disruptions had prompted a turn toward coal, hydropower and nuclear power. This shift is not entirely new. Local coal from the Thar region of Sindh, estimated at around 175 billion tonnes, had been gaining ground even before the crisis. By March 2025, local coal's contribution to the national energy mix had risen to 17 percent, up from 11 percent a year earlier. The coal-fired plants operational since 2019 have generated over 27,000 GWh of electricity at a fuel cost of just Rs4.8 per unit, a fraction of the Rs19.5 per unit cost for imported coal. This shift has saved Pakistan approximately \$1.3 billion in foreign exchange, according to the Sindh government. In March 2025, the average fuel cost per unit dropped to Rs12.2, down 27 percent from Rs16.8 a year earlier.

THE STRAIT OF HORMUZ CRISIS EXPOSED PAKISTAN'S DANGEROUS DEPENDENCE ON IMPORTED LNG AND VULNERABLE SUPPLY ROUTES. THE DISRUPTION HIGHLIGHTS THE URGENT NEED TO DIVERSIFY THROUGH SOLAR, WIND, HYDROPOWER, NUCLEAR AND DOMESTIC COAL, WHILE DEVELOPING STRATEGIC GAS STORAGE AND A MORE RESILIENT ENERGY SYSTEM.

Nuclear power has also been quietly expanding its share. Its contribution to the power mix tripled from 8 percent in 2020 to 27 percent in 2025. In December 2025, nuclear remained the largest single contributor, generating 2,126 GWh, or 25.1 percent of total output. Hydropower, meanwhile, has climbed to around 30 percent of generation. These indigenous sources have provided a buffer, but they cannot fully replace the flexible, dispatchable nature of gas-fired generation. Gas plants can ramp up quickly to meet peak demand. Coal and nuclear plants are better suited to baseload operations. The loss of LNG has exposed a structural gap in the grid that cannot be closed overnight.

The renewable energy potential, however, is enormous and largely untapped. Pakistan receives some of the highest solar isolation in the world, with a potential of over 2.9 million MW. Its coastal regions, particularly in Sindh and Balochistan, hold an estimated wind energy potential of approximately fifty thousand MW. The World Bank has estimated that utilising just 0.071 percent of the country's area for solar photovoltaic power generation would meet Pakistan's current electricity demand. Yet the installed capacity of solar and wind energy in Pakistan remains just over 1,500 Megawatts, or about 4 percent of total capacity and around 2 percent of total generation. The government has set a target of deriving 60 percent of its electricity from clean and renewable sources by 2030. The grid currently carries 2,000 MW of wind, 800 MW of solar and over 10,000 MW of hydropower. The gap between ambition and reality remains wide, but the crisis has made the case for acceleration more urgent than ever.

The private sector is also moving. Pakistan's Universal Gas Distribution Company held discussions with several international firms at the Gastech conference on potential projects, including gas storage, long-term LNG supplies and gas distribution in overseas markets. UGDC Chief Executive Officer Ghiyas Abdullah Paracha said the company received a greater-than-anticipated response. Several companies showed interest in building gas storage facilities in Pakistan, while others expressed keen interest in long-term LNG contracts with UGDC. Paracha said UGDC's participation at Gastech was also significant because the company was presenting Pakistan's gas-sector reforms and the opening of the country's gas market to private-sector participation at an inter-



national energy forum. These discussions may not solve the immediate crisis, but they signal a recognition that the old model of relying on a single supplier through a single chokepoint is no longer tenable.

Looking ahead, the future scene for Pakistan's energy system will be shaped by how decisively it acts now. The Gastech report suggested that countries were examining options for expanding operating reserves to ensure grid agility for unexpected events and rethinking fuel stockpiles by expanding strategic stocks for transport fuels and power generation. They may also look at boosting cross-border power export and import options to share shortages. For Pakistan, this could mean accelerating the deployment of utility-scale solar and wind projects that can be built quickly, paired with battery storage to provide the flexibility that gas plants once offered. It could mean fast-tracking Thar coal projects that are already in the pipeline, while investing in carbon capture technologies to mitigate environmental impact. It could mean expanding nuclear capacity, which has already proven its reliability. And it could mean building the gas storage infrastructure that would allow the country to hold strategic reserves rather than depending on just-in-time deliveries from a volatile region.

The crisis has also revealed a deeper truth about energy security. For years, Pa-

kistan's power sector was designed around imported fuel. The guaranteed operation of regasified LNG plants inhibited domestic gas exploration and forced state buyers to absorb expensive contractual volumes even when demand was weak. The share of LNG-fired power generation has fallen from 20 percent in the first quarter of 2024 to 14 percent in the third quarter of 2025, as the government prioritises coal-based and renewable sources to reduce import exposure. This is a necessary correction, but it must be managed carefully. The grid still needs reliable capacity. The industrial sector still needs affordable energy. The fertiliser plants that depend on gas for feedstock cannot simply switch to solar. A balanced approach that combines indigenous coal, expanded renewables, nuclear baseload and strategic gas reserves is the only realistic path forward.

The Strait of Hormuz may eventually reopen. Shipping may resume. But the lesson of 2026 will not be forgotten. Pakistan has learned that energy sovereignty cannot be outsourced to a waterway thousands of miles away. The sun that beats down on Sindh, the wind that sweeps across Balochistan, the coal that lies beneath Thar and the uranium that fuels its reactors are all within its own borders. The question now is whether the country can mobilise them quickly enough to ensure that the next crisis does not find it equally exposed.



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BUILDING GLOBAL PAKISTANI COMPANIES

PAKISTAN HAS STRONG ENTREPRENEURIAL TALENT, CAPITAL AND A GLOBAL DIASPORA, BUT PROTECTIONISM AND DOMESTIC INSTABILITY LIMIT INTERNATIONAL COMPETITIVENESS. THE NEXT STAGE REQUIRES PAKISTANI BUSINESSES TO EXPAND ABROAD, ACQUIRE GLOBAL BRANDS AND TECHNOLOGY, AND EMBRACE COMPETITION, INNOVATION AND OUTWARD INVESTMENT TO BUILD GLOBALLY COMPETITIVE ENTERPRISES.



ancing is scarce and costly, with interest rates that would kill most business plans before they begin. Regulation is inconsistent, taxation is complex and burdensome, and the economy lurches from one crisis to the next.

Building a major company in Pakistan is not for the faint hearted. The obstacles are relentless and they are structural. Political instability has been a constant for decades, with governments rarely completing their terms and policy direction shifting with every administration. Energy shortages that once meant factories shutting for hours at a time have evolved into something arguably worse. Pakistan now relies on imported fuel for nearly eighty per cent of its energy needs, leaving businesses exposed to every global price shock. Electricity tariffs rank among the highest in the region, and manufacturers in Bangladesh, India and Sri Lanka pay far less for power that arrives more reliably. The rupee has been in freefall for years, sliding from around one hundred and ten to the dollar in 2018 to roughly two hundred and eighty by late 2025, a loss of nearly two thirds of its value. That depreciation makes imported machinery, raw materials and technology punishingly expensive. Fi-

Anyone who has built a company in this environment deserves genuine respect. It takes resilience, improvisation and a tolerance for uncertainty that most entrepreneurs elsewhere never have to develop. Yet resilience at home does not automatically translate into competitiveness abroad. Many of Pakistan's most successful businesses have grown behind protective walls. Import barriers shield them from foreign competition. Cheap labour keeps costs down. Concentrated markets allow a handful of players to set prices. Licences and long established networks create moats that no newcomer can cross. None of this is illegitimate. Domestic success is real and valuable. But it is also true that these advantages do not travel. A company that has never faced a serious foreign competitor in its home market is not automatically equipped to win in markets where the rules are different, the competitors are stronger and the customer has no reason to be loyal.

The experience of Pakistanis abroad offers a striking contrast. There are nearly four million Pakistanis in the Gulf, one point six million in the United Kingdom and another million across the United States and Canada. Many of them arrived with little more than qualifications, savings or an idea. They had no inherited industrial platforms, no captive domestic market and no influential contacts in the corridors of power. What they did have was an environment where effort and ability were rewarded. Self employment rates among Pakistani men in the United Kingdom are



among the highest of any ethnic group, with studies showing rates above thirty per cent compared to around thirteen per cent for the white British workforce. Pakistani entrepreneurs in Britain built Bestway Wholesale into one of the country's largest wholesale and retail operations. In North America, figures like Shahid Khan, who arrived in the United States as a student and went on to own Flex-N-Gate and the Jacksonville Jaguars, and the founders of Ciena Healthcare, built multi billion dollar enterprises from scratch. In the Gulf, Pakistanis own thousands of companies across sectors, from trading and logistics to technology and healthcare. None of these people had protection. None of them relied on import barriers or subsidised gas. They competed openly and they won. The lesson is uncomfortable but clear. Pakistan does not lack entrepreneurial talent. It lacks the environment, and the ambition, to turn that talent into globally competitive enterprises at home.

For decades, Pakistan's economic debate has correctly focused on attracting foreign direct investment. International companies bring capital, technology and access to global markets. That objective remains as sound as ever. But it should be matched by an equally serious question that is rarely asked. How do we build Pakistani companies capable of investing in the rest of the world? The strongest economies do both. They draw in international capital while their own firms expand overseas, acquire businesses and grow brands that are recognised across borders. South Korea built Samsung and Hyundai. Turkey has companies that operate across Europe, the Middle East and Africa. India has Tata, Reliance and Infosys. Pakistan's outward foreign direct investment remains modest, with direct investment assets abroad standing at only around two point three billion dollars by September 2025. For a country



of more than two hundred and forty million people, that is a remarkably small footprint.

The next generation of Pakistan's established business families has a genuine opportunity that their predecessors did not always have. Many of them inherit capital, industrial platforms, networks and infrastructure that took decades to build. Preserving that inheritance is responsible stewardship. But it should not be the limit of their ambition. If you inherit a textile business, why remain solely a supplier to international brands rather than building or acquiring one? If you inherit a pharmaceutical company, why should Pakistan remain its only serious market? If your family controls an industrial group, why not acquire technology or distribution networks abroad? And why does a house in Notting Hill or a penthouse in Dubai count for more than a company headquartered there? The contrast between the personal wealth that Pakistani business families hold abroad and the business operations they run abroad is striking. Few if any of Pakistan's top twenty five business groups own or operate sizeable ventures overseas.

There are signs of change. Interloop Holdings, a textile conglomerate that supplies socks and leggings to Nike, Adidas and Marks and Spencer, is expanding into dairy through a Turkish joint venture and aims to export mozzarella cheese to a Gulf market that imports more than two point three billion dollars of cheese and butter annually. The Nishat Group acquired a controlling stake in Rafhan Maize in a transaction valued at around 66 billion rupees, marking one of the largest private cross border acquisitions in Pakistan's history. Ismail Industries has established a wholly owned subsidiary in Spain. Pace Pakistan is developing a commercial project in Dubai. International Industries has set up subsidiaries in Australia, Canada

and Ireland. These are encouraging steps, but they are still exceptions rather than the rule.

Business cannot carry this transformation alone. Policymakers must draw a clear distinction between capital flight and productive outward investment. Moving personal wealth abroad to protect it from domestic instability is one thing. A Pakistani company investing overseas to acquire customers, technology or productive capacity is quite another. Done well, outward investment can return dividends, expertise and networks to Pakistan's own economy. It can expose Pakistani managers to global standards. It can create channels for technology transfer that no amount of aid or advice can replicate. Commercial diplomacy should ask not only how to attract foreign investment but how to help Pakistani companies become international ones.

The challenge is not simply economic. It is psychological. Decades of protection and patronage have created a business culture that prizes low risk and high margins within a familiar domestic arena over the uncertain rewards of global competition. The stock market and property market have delivered excellent returns with minimal effort, as one prominent businessman observed, so why struggle in foreign markets for moderate returns. That calculation is rational for individuals. It is corrosive for a nation. A country that produces globally competitive companies is a country that has learned to compete on merit rather than connection, on innovation rather than protection, on ambition rather than entitlement. Pakistan has the talent. It has the capital. It has the diaspora networks. What it needs now is the will to look beyond its own borders and to build companies that can stand on their own in the world's most demanding markets.

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DR UME HABIBA

A Champion of Wildlife Conservation

By safeguarding the Margalla Hills, rescuing endangered animals and inspiring the next generation of conservationists, Dr. Um-e-Habiba is helping build a safer future for Pakistan's wildlife.

At first glance, the Margalla Hills appear peaceful. Green slopes stretch across Islamabad, forests move gently with the wind, and wildlife finds refuge among the rocks and trees. But behind this natural beauty lies a demanding world of conservation, one that requires constant vigilance, scientific knowledge and extraordinary commitment.

For Dr. Um-e-Habiba, Deputy Director of Wildlife at the Islamabad Wildlife Management Board (IWMB), protecting this fragile ecosystem has become a life's mission. For the past 13 years, Dr. Habiba has dedicated herself to wildlife conservation, taking on some of the most challenging responsibilities in the field. It is about protecting an entire ecosystem, and the delicate relationship between people and nature.

Dr. Habiba's professional journey reflects a deep commitment to understanding and protecting Pakistan's natural resources. Before joining the IWMB, she served on the faculty of the University of Haripur, where she specialized in wildlife and forest management.

Her academic background provided a strong foundation for the challenges she would later face in the field. Today, as Deputy Director of Wildlife at the IWMB, she works alongside her team to manage wildlife and conservation activities across the federal capital, with particular emphasis on the Margalla Hills National Park.

Wildlife protection and anti-poaching operations remain among the team's most important duties, while visitor management, wildlife research, human-wildlife conflict resolution and forest-fire response require continuous attention.

Among the species receiving particular attention is the Common Leopard, one of the most iconic inhabitants of the Margalla Hills. Protecting such animals is not simply about keeping them alive. It also means protecting their habitat and finding ways for wildlife and expanding human communities to coexist.

At the heart of its rescue efforts is the Wildlife Rescue and Rehabilitation Centre,

established at the site of the former Islamabad Zoo. The centre became operational in 2020 following the closure of the zoo after a landmark decision by the Islamabad High Court.

Since then, more than 500 animals and birds have been rescued, including black bears, leopards, pangolins, freshwater turtles and various birds of prey. For many of these animals, rescue is only the beginning.

The ultimate goal is rehabilitation and, whenever possible, a return to the wild.

Today, more than 100 species are undergoing treatment and recovery at the IWMB's Rescue and Rehabilitation Centre. Each animal presents its own challenges, requiring appropriate care, treatment and rehabilitation before a decision can be made about its future.

For conservationists, the most rewarding outcome is not keeping an animal in captivity, it is seeing a successfully rehabilitated animal return to its natural habitat.

Wildlife conservation in Pakistan involves much more than protecting individual animals.

Illegal wildlife trade, trafficking, poaching, habitat loss and human-wildlife conflict continue to pose serious challenges. The IWMB therefore plays an important role in responding to wildlife abuse and trafficking while working to protect endangered and vulnerable species.

A rescued animal may require immediate medical attention. A threatened species may require habitat protection. A conflict between people and wildlife may require careful intervention. A forest fire can threaten an entire ecosystem within hours.

Dr. Habiba's journey has also carried another challenge: establishing herself as a woman in a field traditionally dominated by men.

Working in wildlife conservation can be physically demanding and unpredictable. Field assignments can take conservation professionals into remote forests, rugged mountains and difficult terrain. The responsibilities can be demanding, and the challenges are often immediate.

Her experience demonstrates that conservation is not limited by gender. Knowledge, determination, courage and commitment can be equally powerful tools in protecting the natural world.

These experiences have brought her face-to-face with remarkable wildlife and, equally importantly, with the communities

NEVER GIVE UP ON YOUR DREAMS. PURSUE YOUR PASSION WITH DETERMINATION AND PERSEVERANCE. THE JOURNEY WILL NOT BE EASY, BUT IT WILL BE WORTH IT. THE STORY OF DR. UM-E-HABIBA IS ULTIMATELY A STORY ABOUT MORE THAN ONE CONSERVATIONIST.

living alongside these ecosystems.

Conservation cannot succeed through wildlife protection alone. It also requires people to understand the importance of nature and their own role in protecting it.

Every successful rescue, every protected habitat and every person inspired to care about wildlife represents another step toward a more sustainable relationship between humans and the natural world.

Perhaps one of the most important aspects of Dr. Habiba's journey is the inspiration it offers to young people, particularly young women considering careers in conservation and environmental sciences.

Her own career illustrates that meaningful change rarely happens overnight. It comes through years of dedication, difficult decisions, setbacks, learning and persistence. The story of Dr. Um-e-Habiba is ultimately a story about more than one conservationist or one institution.

It is about the responsibility to protect the natural heritage that belongs not only to the present generation, but also to those who will come after us. From the slopes of the Margalla Hills to the animals recovering at the IWMB's rehabilitation centre, her work represents a continuing effort to give wildlife a chance to survive and thrive in a rapidly changing world.

Her journey is a reminder that conservation begins with commitment, but its impact can extend far beyond one person. By protecting an animal, restoring a habitat or inspiring a young conservationist, one individual's efforts can create ripples that continue for generations.

And in the quiet forests of the Margalla Hills, those efforts may ultimately help ensure that Pakistan's wild places remain home to the remarkable creatures that have inhabited them for centuries. ■



Post-Apocalyptic Horror / Sci-Fi Thriller

RETURNS TO THE WORLD OF THE RAGE VIRUS NEARLY THREE DECADES AFTER THE ORIGINAL OUTBREAK. DANNY BOYLE AND ALEX GARLAND COMBINE INTENSE HORROR, FAMILY DRAMA AND SCIENCE FICTION AS YOUNG SPIKE VENTURES BEYOND HIS PROTECTED COMMUNITY. THE FILM EXPLORES SURVIVAL, ADAPTATION, GENERATIONAL TRAUMA AND WHAT REMAINS OF HUMANITY.

Nearly three decades after the Rage Virus changed the world, Danny Boyle and Alex Garland return to their groundbreaking horror universe with a haunting story of survival, isolation, family, and what remains of humanity after civilisation has collapsed.

When *28 Years Later* arrived in theaters in June 2025, it marked the long-awaited return of director Danny Boyle and writer Alex Garland to the world they created with *28 Days Later* in 2002. Nearly three decades after the original outbreak, the new film moves the story beyond the immediate aftermath of the Rage Virus and into a world where survivors have learned to live with its consequences.

Set in a Britain still shaped by the virus, the story follows Spike (Alfie Williams), a young boy living with his mother, Isla (Jodie Comer), in an isolated island community. Connected to the mainland by a heavily guarded causeway, the settlement offers protection from the infected world beyond it. But when Spike ventures onto the mainland, he discovers a landscape far stranger and more dangerous than he expected.

The journey becomes more than a fight for survival. It becomes a coming-of-age story about family, fear and discovering what remains of humanity after generations have grown up in the shadow of catastrophe.

A World That Learned to Survive

One of the film's most interesting ideas is that humanity has not simply waited for the apocalypse to end. It has adapted to it. After almost thirty years, survivors have created communities, rules and systems designed to keep them alive. Yet this security comes with a price: isolation from the

outside world and a constant fear of what lies beyond their borders.

The heavily defended causeway represents that divide. On one side is the protected community Spike knows; on the other is a mainland that has changed dramatically. Nature has reclaimed abandoned spaces, the infected have evolved in unexpected ways, and the survivors have little understanding of what has happened beyond their isolated existence.

For Spike, crossing the causeway means entering a world he has only heard about. It also means questioning the beliefs and limitations imposed upon him. The film therefore turns the familiar survival-horror formula into a broader exploration of how people build societies when fear and survival become the foundations of everyday life.

A Coming-of-Age Story

At the emotional center of *28 Years Later* is Spike, a member of the first generation to grow up entirely after the original outbreak. Unlike the characters of *28 Days Later*, he has no personal memory of the world before the Rage Virus. For him, the apocalypse is not a historical event, it is normal life.

That perspective gives the film much of its emotional weight. Spike's desire to explore the mainland conflicts with his mother's instinct to protect him. Their relationship reflects a familiar struggle between parental protection and a young person's desire for independence, but in this world, curiosity can have deadly consequences.

Alfie Williams gives Spike a restrained and vulnerable presence, allowing the audience to experience much of the strange new world through his eyes. His journey is therefore both physical and emotional: he is not only trying to survive the dangers of the mainland but also discovering the complexities of adulthood, family and the society in which he was raised.



Danny Boyle's Return to Horror

Danny Boyle's return gives the film a visual energy that recalls the raw intensity of 28 Days Later while expanding the scale of the story. Rapid editing, unconventional camera work and disturbing imagery create a world that feels unstable and unpredictable. Cinematographer Anthony Dod Mantle captures the contrast between Britain's natural beauty and the horror that exists within it. Forests, hills and remote landscapes replace much of the deserted urban imagery associated with the original film. Nature has continued to thrive even as human civilization has been transformed, creating an unsettling sense that the world does not necessarily need humanity to survive.

The film's visual style is often chaotic by design. Violence arrives suddenly, while moments of peace can quickly turn threatening. This creates an atmosphere in which both the characters and the audience are uncertain about what might happen next.

The Infected Have Changed

The Rage Virus was already different from the traditional zombie concept. Its victims were living humans transformed into violently aggressive beings rather than supernatural undead creatures. Nearly three decades later, 28 Years Later expands this idea by introducing different forms of infected.

This development gives the film an additional sense of mystery. The infected are no longer simply a familiar threat chasing survivors. They have become part of a changing ecosystem, creating new dangers that the characters do not completely understand.

The film's treatment of the infected also reinforces one of its central themes: adaptation. Humanity has changed in response to the virus, but the virus and its victims have changed as well.

A Strong Ensemble Cast

The film's central performances help ground its unusual story. Jodie Comer brings emotional depth to Isla, a mother determined to protect her son while facing circumstances beyond her control. Aaron Taylor-Johnson, as Jamie, adds another dimension to the complicated family dynamic. Ralph Fiennes, playing Dr. Kelson, provides one of the film's more mysterious and philosophical characters. His presence becomes particularly important as the story

moves beyond straightforward survival horror and begins exploring questions about disease, death and human nature.

Jack O'Connell also plays an important role in the film's wider mythology, suggesting that Spike's personal journey is connected to a much larger story still unfolding.

Horror With Something to Say

Beneath its violence and terrifying imagery, 28 Years Later is concerned with ideas of isolation, generational trauma, fear and the fragility of civilisation. The survivors have spent decades protecting themselves by separating their community from the infected world. Their security keeps them alive, but it also shapes how they understand everything beyond their borders.

The film asks what happens when an entire generation inherits fear without remembering the event that created it. Spike's generation knows the rules of survival but has little connection to the world those rules were designed to protect.

In this sense, the Rage Virus becomes more than a horror device. It becomes a way of examining how societies change when people live under permanent threat, and how difficult it can become to distinguish protection from confinement.

Beautiful, Brutal and Unpredictable

Visually, 28 Years Later is one of the film's strongest elements. Boyle and Mantle create a world that can appear beautiful one moment and deeply disturbing the next. The natural landscapes provide a striking contrast to the violence taking place within them.

The action sequences are deliberately chaotic, using rapid movement, editing and sound to place the audience close to the characters. Some of the film's strangest moments are also among its most memorable, although this experimental approach can occasionally make the story feel uneven. That balance between conventional horror and more unusual storytelling is central to the film's identity. 28 Years Later is clearly not trying to be a simple continuation of the original movie.

Critical Reception

The film received a generally positive critical response, although audience reac-

tions were more divided. Rotten Tomatoes lists 28 Years Later with an 88% critics' score and a 63% audience score, while Metacritic gives the film a 77/100 critics' score.

Critics have praised Boyle's direction, the performances, the atmosphere and the film's willingness to expand the franchise. Some have also pointed to its uneven narrative structure and ambitious mixture of horror, family drama, coming-of-age storytelling and science fiction.

A New Chapter for the Franchise

28 Years Later also serves as the beginning of a new chapter in the franchise. The film introduces new characters, expands the mythology of the Rage Virus and leaves several questions open for future stories.

The story continues with 28 Years Later: The Bone Temple, directed by Nia DaCosta and written by Alex Garland. The follow-up expands the world established in the 2025 film and continues exploring the survivors and the changing nature of the Rage Virus.

Final Thoughts

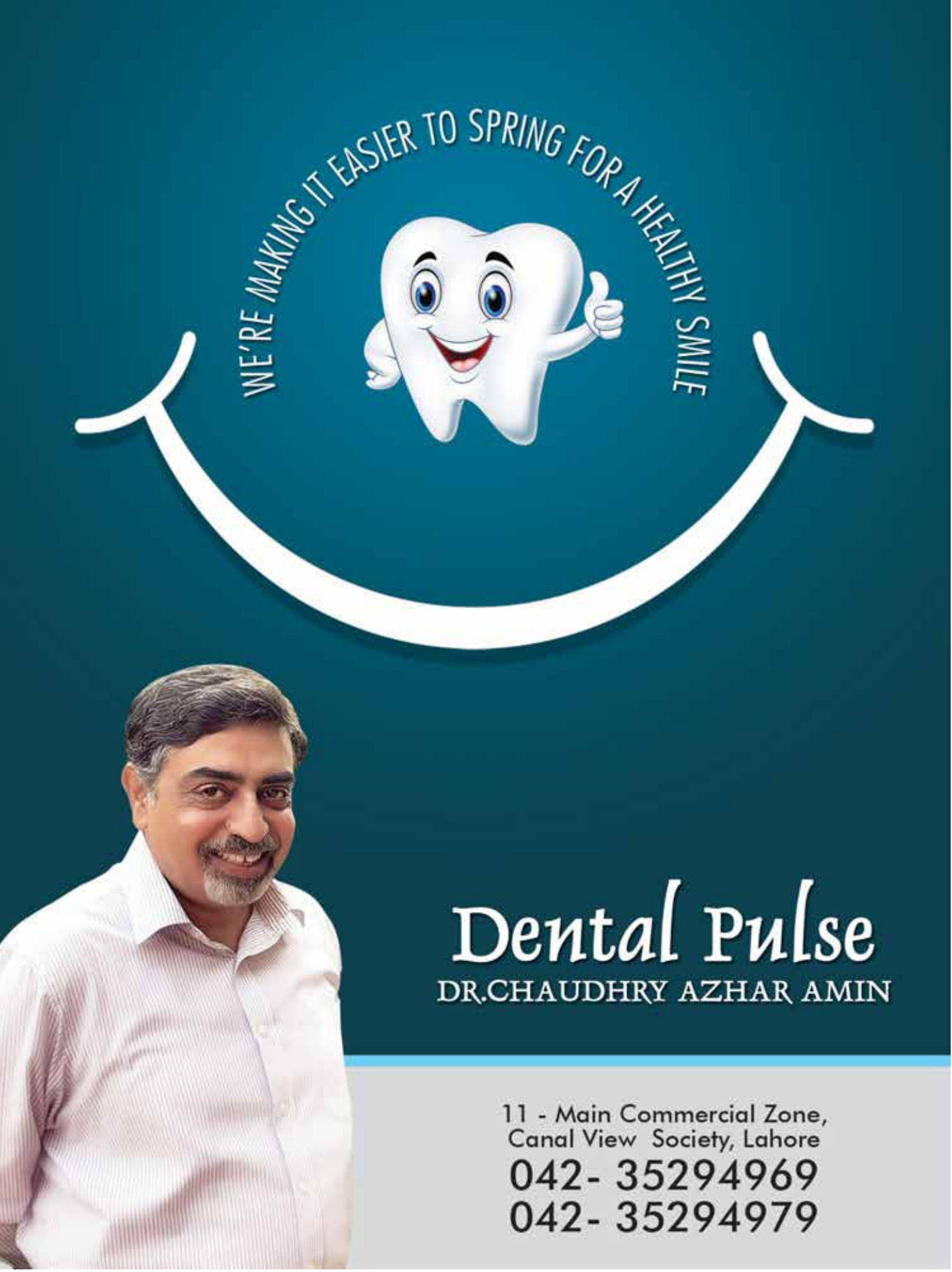
28 Years Later is an ambitious return to one of modern horror cinema's most influential worlds. Danny Boyle and Alex Garland avoid simply recreating 28 Days Later, instead imagining what happens when nearly three decades of survival have transformed both society and the people living within it.

The film combines horror, family drama, coming-of-age storytelling and science-fiction ideas while introducing a new generation of characters to the franchise. Its unconventional style and narrative choices may not appeal to every viewer, but they give the film a distinctive identity.

At its heart, 28 Years Later is not simply about infected humans and survivors. It is about what survives when the world we once knew disappears, and what humanity becomes when survival lasts for generations.

Nearly thirty years after the Rage Virus changed Britain forever, the greatest question may no longer be whether humanity can survive the infected.

It is whether humanity can remain human after learning to live with them.

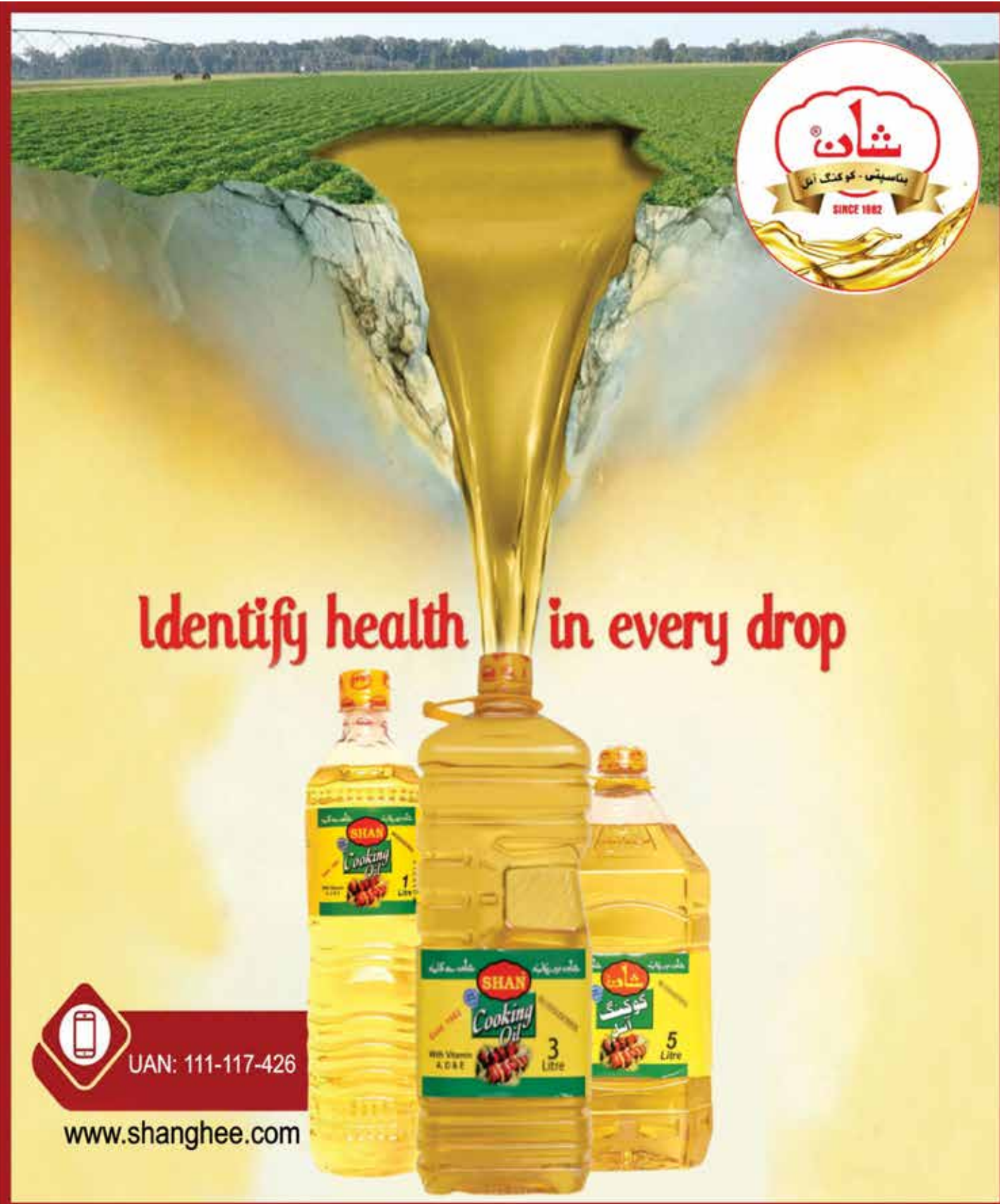


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TECH NEWS



Pakistan Wins Three International Digital Excellence Honours

Pakistan has received three major recognitions at the Commonwealth Telecommunications Organisation (CTO) Digital Excellence Awards 2026 in London, highlighting progress in digital policy, public-service delivery and telecommunications governance. Pakistan won the Digital Policy & Regulatory Excellence award for its National Incubation Centers initiative, which supports young entrepreneurs through mentoring, technology assistance, business development services and access to investors. The country also secured the runner-up position in the 21st Century Government / E-Government Initiatives category for its digital transformation of government relief delivery, designed to improve transparency, efficiency, targeting and accountability. Pakistan's Integrated Spectrum Governance Reform was also selected as a finalist in the Digital Policy & Regulatory Excellence category. The achievement was particularly significant because Pakistan was the only CTO member state among 56 members to receive recognition across three nominated initiatives. The awards underline the growing role of digital technology in entrepreneurship, government services and telecommunications regulation and strengthen Pakistan's international profile as it pursues its Digital Pakistan ambitions.

Karachi Moves Toward AI-Ready Data Centre Infrastructure

Pakistan is moving to strengthen its digital infrastructure as the Sindh government and CMPak, the parent company of Zong, pursue plans for an AI-ready Tier-III data centre in Karachi. The proposed facility is intended to support secure data hosting, cloud computing, artificial intelligence applications and digital services for businesses and government institutions. The project reflects growing demand for local computing infrastructure as Pakistan expands its AI and digital economy. CMPak has highlighted the importance of reliable electricity, enhanced grid capacity and suitable industrial power arrangements because AI-focused data



centres require substantially greater computing and energy resources than conventional facilities. With AI adoption accelerating globally, locally available data centres could become an important foundation for Pakistan's technology sector, supporting cloud services, enterprise applications, government digitalisation and future AI development.



Goods Exports of Pakistan Rise 17.6% to \$2.94 Billion in September

The goods exports of Pakistan increased by 17.6% year-on-year in September 2026, reaching \$2.94 billion compared with \$2.50 billion during the same month last year. According to Pakistan Bureau of Statistics data, exports during the first quarter of FY2026-27 reached \$8.42 billion, representing a 10.84% increase over the \$7.60 billion recorded during the corresponding period of the previous fiscal year. September also recorded strong month-on-month growth, with exports rising more than 16% from August. Agriculture and food exports increased by 23% during the first quarter, while manufacturing, mining and energy exports grew by 17%. Textiles and apparel recorded six percent growth. The government says the sustained improvement in exports is strengthening foreign-exchange earnings and supporting the country's transition toward a more export-oriented economy. However,

imports also increased during the quarter, keeping the trade deficit under pressure. Continued value addition, product diversification and improved international competitiveness will therefore remain important for sustaining export growth.



Pakistan Strengthening Its National Cybersecurity Response

Pakistan is expanding its institutional capacity to combat cyber-crime as authorities intensify action against online fraud and other digital threats. The National Cyber Crime Investigation Agency (NCCIA) has recently conducted operations against alleged illegal call centres involved in fraudulent activities targeting people abroad. In Lahore, authorities arrested dozens of suspects and seized computers, laptops, mobile phones and other digital evidence. In a separate October 6 operation, 39 people were arrested from an alleged illegal call centre reportedly operating under the cover of a medical billing business. Meanwhile, the NCCIA is preparing a new headquarters in Islamabad equipped with modern forensic laboratories, digital investigation systems and upgraded IT infrastructure. The developments reflect growing recognition that cybercrime requires specialised investigative capabilities, digital forensics and stronger institutional coordination.



The Digital Exports Move Toward a High-Value Knowledge Economy

Pakistan's technology sector is becoming an increasingly important source of foreign exchange as ICT, freelancing and digital services continue to expand. Recent official figures show strong growth in technology-related exports, with information technology and related services emerging among the country's fastest-growing services sectors. Freelancing is also gaining importance as Pakistani professionals provide software development, design,

digital marketing, programming and other specialised services to international clients. Industry observers argue that the next stage of development should focus on moving beyond low-cost outsourcing toward higher-value knowledge services, including artificial intelligence, cybersecurity, cloud computing, data analytics and specialised software. Pakistan's large young population provides a substantial potential workforce, but continued progress will depend on better digital infrastructure, technical education, reliable international payment channels and greater investment in technology companies. The growth of digital exports is particularly significant because technology services can generate foreign exchange without the physical logistics required by traditional goods exports.

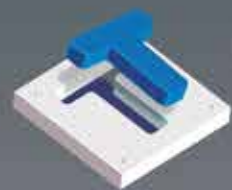


Port Qasim Authority and NTC Sign Digital Infrastructure Agreement

The National Telecommunication Corporation (NTC) and Port Qasim Authority (PQA) have signed an agreement to cooperate on digital infrastructure and ICT services at one of Pakistan's most important commercial and industrial locations. The collaboration covers secure connectivity, dedicated internet services, cybersecurity, cloud and data-centre services, unified communications and enterprise digital infrastructure. The agreement was signed during ITCN Asia 2026 in Karachi and reflects the increasing importance of reliable digital networks for ports, logistics and industrial operations. Officials highlighted the need for resilient fibre-optic connectivity, data centres, uninterrupted power and cybersecurity as Pakistan expands its digital economy. The partnership also supports broader government efforts toward cloud-first digital infrastructure and stronger national control over critical networks. Modern ports increasingly depend on digital systems for cargo management, logistics, communication, security and business operations.

Pakistan's Inflation Eases to 10.3%

The decline was mainly attributed to a slowdown in food inflation, although several essential and energy-related items continued to record significant annual increases. Rural inflation fell to 10.5%, while urban inflation eased to 10.1%. On a year-on-year basis, some food commodities, including onions, wheat and wheat flour, recorded substantial increases, while prices of potatoes, sugar, chicken and eggs declined compared with the previous year. The September inflation figure remained within the Finance Ministry's projected range of 10–11%. The moderation provides some relief for consumers and businesses, although persistent food and energy pressures continue to influence household budgets and operating costs.



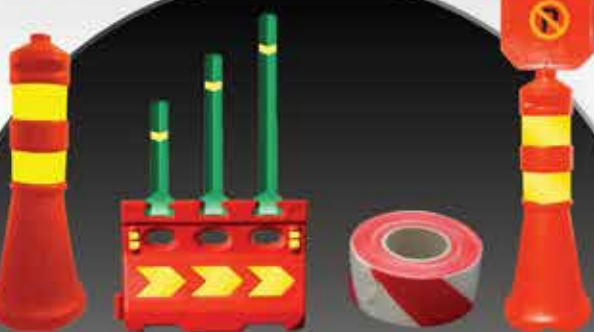
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