



DAILY CURRENT AFFAIRS

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Topics Covered

- Airlines must enforce regulations without delay, cautions DGCA
- A grand vision and the great Indian research deficit
- Linked civilisations, a modern strategic partnership- India- Iran
- What are rare-earth elements and why is everyone looking for them?

DGCA Guidelines

Airlines must enforce regulations without delay, cautions DGCA

In circular to stakeholders, regulator flags potential risks to aviation safety due to 'lack of requisite level of preparedness' in complying with guidelines

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The Directorate General of Civil Aviation (DGCA) has warned that lack of preparedness among airline operators in complying with guidelines issued by the regulator from time to time poses potential risks to aviation safety.

The DGCA periodically issues operating regulations to ensure flight safety, operational efficiency and overall aviation safety through Civil Aviation Requirements (CARs), Aeronautical Information Circulars (AICs) and other notifications.

Compliance with these regulations by operators is mandatory.

In a safety circular issued to all stakeholders, the DGCA stressed that proper and effective compliance with regulatory requirements could be achieved only through advance preparation.

Lack of preparedness

"It has been noticed that there is a lack of the requisite level of preparedness to ensure timely and effective implementation of regulations issued by the DGCA. This has resulted in potential risks to aviation



Calling out delays: Stakeholders have been instructed to closely monitor the implementation of Civil Aviation Requirements, Aeronautical Information Circulars and other directives. **ANI**

safety and inconvenience to passengers," the circular said.

Highlighting the importance of adequate planning, the regulator advised all stakeholders to devise a detailed implementation strategy well in advance of the effective date of any new operating regulation. The strategy should factor in both available resources and additional requirements, if any, it said.

Timely availability

Airline operators and other stakeholders were directed to ensure the timely availability of all resources

and verify their functionality.

"Wherever necessary, functionality trials or dry runs shall be completed well ahead of implementation," the DGCA said.

The regulator has also sought submission of implementation plans, along with data and results of dry runs, prior to the actual date of enforcement of the regulations.

Stakeholders have been instructed to closely monitor the implementation of CARs, AICs and other directives for a period of six months and submit periodic reports to the DGCA.

A grand vision and the great Indian research deficit

India wants to become a global economic and technology power. It has a huge population and fast economic growth. But one major weakness is holding it back - **very low investment in research and development (R&D).**

Without strong research, a country cannot lead in technology or innovation.

A grand vision and the great Indian research deficit

India stands at a pivotal moment in its economic and technological trajectory. With its vast human capital and a rapidly expanding economy, it harbours ambitions of becoming a global power. Yet, this grand vision is significantly hampered by a deep-seated and chronic insufficiency in research and development (R&D).

The scale in numbers

The scale of India's R&D deficit is best illustrated by a few stark numbers. Despite having 17.5% of the world's brains (since it is home to 17.5% of the world's population), India produces only a meagre 3% of the world's research output. This disparity highlights a fundamental failure in leveraging its massive demographic dividend to generate high-value research.

The situation is not much better on intellectual property creation. Recent reports from the World Intellectual Property Organization (WIPO) suggest a mixed picture: dramatic growth from a very low base, but overall an unimpressive performance. In 2023, India was ranked sixth globally for total patent filings, recording 64,480 applications. This represents the fastest growth (+15.7%) among the top 20 countries and is a significant figure. However, in the context of the total 3.55 million patent applications filed globally in 2023, India's share is still low, at approximately 1.8% of the global total. Critically, when measuring resident applications per million inhabitants, a truer reflection of domestic innovation intensity, India ranks significantly lower (47th), underscoring that the overall growth is not yet translating into widespread, population-level innovation dominance.

The most damning evidence of India's R&D gap lies in R&D expenditure. Gross Expenditure on R&D in India, covering both private and public sectors, has consistently hovered between 0.6% and 0.7% of GDP in recent years (and is slipping as GDP grows). This figure pales in comparison to major economies and innovation hubs: China spends around 2.4%, the United States is at approximately 3.5%, and Israel leads globally at over 5.4%. To grasp the magnitude of underinvestment, one only needs to compare India's entire national R&D spend with that of a single multinational corporation. In 2023, the Chinese technology giant, Huawei, invested a colossal CNY 164.7 billion (approximately \$23.4 billion) into R&D. This amount of spending from just one company – no doubt driven by intense global competition and U.S. sanctions, particularly focusing on crucial areas such as semiconductor technology – exceeds the total combined R&D expenditure of all public and private entities in India, a nation of more than 1.4 billion people. As Nvidia Chairman Jensen Huang noted, Huawei's relentless investment has propelled them to be "nanoseconds" behind the U.S. in advanced semiconductor capabilities. This



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corporate-level intensity of R&D is the engine of next-generation technological power. India's inability to muster even a fraction of this kind of concentrated, strategic investment speaks volumes about the challenge ahead for it.

So much for the numbers. They are merely symptoms of deeper, structural problems within the Indian innovation ecosystem that it must tackle on a war footing.

The government sector is the funds driver

Most disappointingly, private sector participation in R&D spending is abysmal. A global hallmark of a mature innovation economy is the dominant role of the private sector in R&D. In developed nations, industry typically accounts for two-thirds or more of such expenditure. In India, however, the government sector (central, State, higher education, and public sector industry) remains the main driver, contributing approximately 63.6% of R&D funds, with the private industrial sector contributing only around 36.4%. India's business tycoons need to rise to the R&D challenge, but they are instead largely complacent and myopic about it. Indian industry's low investment is driven by a focus on incremental improvements over disruptive innovation, a preference for technology licensing over domestic development, and a general risk-averse culture.

The second dismaying feature is one we had already identified in the second tenure of the United Progressive Alliance: a persistent academia-industry disconnect, the subject of a report N.R. Narayana Murthy wrote for us more than a decade ago that is sadly gathering dust. Indian academia, despite producing millions of highly skilled graduates, often operates in a silo. Research is frequently theoretical and disconnected from the immediate, market-driven needs of the industry. The mechanisms for technology transfer, commercialisation of research, and joint industry-academic projects remain underdeveloped. Nor do Indian companies look to the world of academia for help. In the U.S., companies commonly bring ideas to universities and give grants for student researchers to develop them into marketable innovations. There is no such culture in India. This gulf prevents valuable research from crossing the "valley of death" between the laboratory and the marketplace.

And there is no escaping the brain drain. While India produces a vast number of PhDs and engineers, the most ambitious and the talented often seek better infrastructure, funding, and career progression opportunities abroad. The domestic R&D environment struggles to attract and retain world-class researchers due to limited high-end research facilities and lower salary benchmarks compared to the rest of the world.

The allocation of public R&D funds is often constrained by slow bureaucratic processes.

Project approval times can be excessively long, and the release of funds is frequently staggered and unpredictable, impeding the smooth execution of ambitious, long-term research programmes.

What, then, is the path forward?

The goal of building comprehensive tech and economic muscle, worthy of a "Viksit Bharat", is not a sprint but a marathon. To achieve it, India must engineer a fundamental shift in its approach. The most immediate and critical step is to raise the R&D expenditure to GDP ratio to at least 2% within the next five to seven years. This requires a massive public spending commitment, coupled with substantial tax incentives and grants to encourage the private sector to ramp up its contribution to at least 50% of the total R&D spend. The launch of the ₹1 lakh crore Research, Development and Innovation (RDI) Fund by the government is a step in the right direction, provided it is disbursed efficiently and targeted towards frontier technologies.

An ambitious India needs to move away from scattered research efforts and focus on national missions in strategic, high-value domains: semiconductors, artificial intelligence (AI), quantum computing, advanced materials and green energy. These missions require long-term, uninterrupted funding and clear, measurable outcomes tied to national security and economic sovereignty.

Universities and research

And there is no escaping India's obligation to reform higher education. Universities must transition from being purely teaching institutions to also becoming centres of excellence in research. This involves significantly boosting funding for PhD programmes, creating competitive research faculty positions, and building world-class research infrastructure. Furthermore, mandatory and structured mechanisms for industry-sponsored research chairs and joint incubation centres must be established to bridge the academic-industry gap.

India must also inculcate a robust intellectual property culture in the country. This means simplifying patent filing processes, strengthening enforcement, and creating attractive financial incentives for inventors (both academic and corporate) whose patents are commercialised.

India possesses the intellectual capital and the aspiration to become a global innovation leader. However, the current deficit in R&D investment – so glaringly exposed by the comparison to a single company such as Huawei – cannot sustain this ambition. The next decade must be dedicated to creating the structural, financial and cultural foundations for innovation. If these fundamental changes are not executed with political will and unwavering commitment, the goal of Viksit Bharat will recede well beyond 2047.

India has **17.5% of the world's population**, but produces only 3% of global research.

In 2023, India filed **64,480 patents**, ranking **6th globally**, and showed the fastest growth rate. But globally, **3.55 million patents** were filed, so India's share is only **1.8%**.

Why is That?

R&D spending. India spends only **0.6–0.7% of its GDP** on R&D. This is far lower than: China (2.4%), USA (3.5%), Israel (5.4%).

Huawei alone spent more on R&D in 2023 than **all of India combined**. That is why China is catching up with the US in advanced technologies like semiconductors. India lacks this kind of focused, large-scale investment.

Why Low Spending?

1. In strong innovation economies, **private companies spend most of the money on R&D**. In India, the opposite happens. Government and public institutions provide **about 64%** of R&D funds and Private industry contributes only **36%**.

2. **Indian companies prefer Small improvements** instead of breakthrough ideas, **Buying foreign technology** instead of developing their own and **Avoiding risk**.

This mindset seriously weakens innovation.

3. **Weak link between colleges and companies:** Indian universities graduate **research rarely helps industry**. Unlike the US, where companies fund university research and work closely with students and professors, **Indian industry and academia barely cooperate**. Because of this gap, good ideas fail to reach the market.

4. **Brain drain problem:** India produces many engineers and PhDs, but the best talent often goes abroad.

Solution?

1. India must increase R&D spending to **at least 2% of GDP** in the next 5–7 years.

- Private companies must be encouraged through tax benefits and grants.
- The private sector should contribute **at least 50%** of R&D spending
- The government's **₹1 lakh crore RDI Fund** is a good step, but it must be used efficiently.

2. **Focus on national technology missions:** India should focus on **key future technologies** like:

- Semiconductors
- Artificial Intelligence
- Quantum computing
- Green energy
- Advanced materials

3. Indian universities must not remain only teaching centres. They should become **research hubs** by:

- Increasing PhD funding
- Hiring strong research faculty
- Building world-class labs
- Creating compulsory partnerships with industry

4. Strong intellectual property culture: India must Make patent filing easier.

Linked civilisations, a modern strategic partnership

Relations between Iran and India transcend the boundaries of conventional diplomacy. They represent an ongoing dialogue between two ancient civilisations that emerged from a shared cultural womb at the dawn of human history. Long before the Aryan tribes divided – one settling on the Iranian plateau and the other in the fertile plains of the Indus and Ganges – they spoke related languages, worshipped through similar myths, and held a common worldview.

The profound resemblance between the Avesta and the Rigveda stands as clear testimony to this shared origin. Through centuries of political change, this civilizational affinity has nurtured a deep reservoir of trust and cultural understanding – never completely severed despite periods of distance and turmoil.

Nowhere is this historical bond more vividly reflected than in the enduring presence of Persian in the Indian subcontinent. India embraced Persian for centuries – not merely as a language, but as a vessel of art, diplomacy and poetry. This cultural hospitality gave rise to the luminous “Indian Style” (Sabk-e-Hendi) in Persian literature, shaped by the imagination and creativity of Indo-Persian poets. Among them, Mirza Abdul-Qadir Bedil Dehlavi shines as the most illustrious figure – a poet whose philosophical depth and boundless imagination expanded the horizons of Persian poetry and continues to inspire scholars and writers across generations.

The modern drivers of ties

In today's world, nostalgia alone cannot sustain bilateral relations. Fortunately, the evolving geopolitical environment and economic needs



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have drawn Tehran and New Delhi closer than ever. As the global order tilts toward multipolarity, the Iran-India axis is positioned to assume a strategic role in shaping regional stability and economic architecture.

Energy security remains a central pillar. India, one of the fastest-growing economies globally, continues to rely significantly on oil and gas to fuel its industries. With extensive hydrocarbon reserves, Iran stands as a natural partner in securing India's long-term energy needs.

Perhaps the most consequential area of cooperation is transport and connectivity. India's participation in the development of the Chabahar Port signals the strategic weight both nations attach to this maritime gateway. Complementing this, Iran forms a vital link in the International North-South Transport Corridor (INSTC) – a multimodal route connecting India to Russia and Northern Europe through Iran. This corridor is approximately 40% shorter and 30% more cost-efficient when compared to the traditional Suez Canal route, granting both countries a competitive advantage in Eurasian trade.

Security and technology

Beyond commerce, Iran and India share mutual concerns regarding regional security. The rise of extremism and terrorism in West and South Asia threatens both nations, making intelligence cooperation a discreet yet essential foundation of bilateral ties.

Challenges remain. Historically, third-party pressures have influenced the trajectory of relations. Yet, India has often navigated these complexities by prioritising its national interest with strategic prudence. In an era marked by shifting power centres and the rise of Asia, it is

imperative for both countries to strengthen flexible financial mechanisms – such as trade through local currencies – to reduce vulnerability to external constraints.

The future demands diversification beyond traditional oil trade. Cooperation in knowledge-based industries, information technology – where India holds significant comparative advantage – and in nanotechnology and the medical sciences (fields in which Iran has made remarkable progress), can open new horizons of economic partnership.

Such collaboration can transform the relationship from transactional to innovation-driven, benefiting both societies.

A shared future built on an ancient past

Iran and India may rightly be described as one soul in two bodies – united by history, enriched by culture, and positioned by geography to complement one another. If the Silk Road and Persian language once formed the bridge between them, today, energy cooperation, counterterrorism and strategic transit connectivity serve as the new pillars of partnership.

As the two nations mark the 75th anniversary of diplomatic relations, the moment is ripe for Tehran and New Delhi to transform historical goodwill into a bold, forward-looking alliance. A revitalised partnership will not only enhance the prosperity of their peoples but also anchor stability in the turbulent landscape of West Asia.

The time has come for Iran and India, guided by their shared legacy and mutual interests, to design a future that is collaborative, resilient, and independent, echoing the ancient symphony of civilisations that still binds them today.

India- Iran

India-Iran relations are not just diplomatic; they are rooted in a **shared civilisational history**. In ancient times, people of both regions spoke related languages and shared beliefs, which is visible in the similarities between the **Rigveda and the Avesta**.

This deep cultural connection created long-lasting trust between the two societies.

A strong symbol of this bond is the **Persian language**, which flourished in India for centuries as a language of administration, art and poetry. This led to the growth of the **Indo-Persian literary tradition (Sabk-e-Hendi)**, with poets like **Bedil Dehlavi** playing a major role in enriching Persian literature.



In modern times, practical interests drive the relationship. **Energy security** is central, as India needs oil and gas while Iran has large reserves.

Connectivity is another key area — India's involvement in **Chabahar Port** and the **International North–South Transport Corridor (INSTC)** helps India access Central Asia, Russia and Europe while reducing cost and distance.

Both countries also share concerns over **terrorism and regional instability, making security cooperation** important. Although external pressures have sometimes affected ties, India has tried to balance relations based on its national interest.

Looking ahead, India and Iran aim to move beyond oil trade by cooperating in **technology, IT, healthcare, nanotechnology and innovation-based sectors**.

With their shared history and complementary strengths, India and Iran have the potential to build a **strong, future-oriented partnership** that promotes regional stability and mutual growth.



Rare Earth Elements

What are Rare-Earth Elements?

Rare-earth elements are a group of 17 metallic elements comprising:

- **15 lanthanides** (lanthanum to lutetium)
- **Scandium and yttrium**

Though called “rare,” many of them are **not scarce in Earth’s crust**, but they occur in **low concentrations** and are mixed together in minerals, making extraction and separation **technically complex and costly**.

The term “earth” comes from an old chemical name for **oxide powders**, as these elements were first identified in oxide form.

Why Are Rare-Earths Important?

Rare-earth elements possess **unique magnetic, optical, and electronic properties**, making them indispensable for modern and green technologies:

Key Applications

1. **Permanent magnets:** Neodymium-iron-boron (NdFeB) magnets- Used in **electric vehicles, wind turbines, generators, robotics, defence systems**
2. **Lighting and optics:** Europium and terbium in phosphors
 - Neodymium and erbium in lasers and fibre optics
3. **Industrial uses**
 - Catalysts, glass and ceramics, polishing powders
 - Electronics, smartphones, batteries, defence equipment
4. **High magnetisation** (strong magnetic field) and **High stability** (resistant to heat, vibration, demagnetisation)

Why Refining Is the Real Bottleneck ?

Unlike oil, rare-earth elements:

- Occur as **solids mixed together**
- Have **very similar chemical properties**, especially neighbouring elements

The process is:

- **Energy-intensive**
- **Environmentally hazardous**
- **Technologically sophisticated**

China's Dominance

- Holds **~44 million tonnes** of reserves (largest globally)
- Controls **~91% of global refining and ~94% of permanent magnet production**
- This gives China significant **geopolitical and economic leverage**, especially in green energy and defence sectors.

Other notable reserves:

- Brazil, India, Australia, Russia, Vietnam, USA, Greenland

Countries are shifting focus from just mining to:

- Domestic refining
 - Magnet manufacturing
 - Supply-chain diversification
- Japan's plan to mine deep-sea rare-earth mud highlights **future competition for access**.