

● POLITY

● ECONOMICS

● TECHNOLOGY

● ECOLOGY

INTERNATIONAL RELATIONS

Several Indians released from Russian Army: MEA

CONTEXT: Several Indians recruited for the Russian army sought discharge, with India mediating and securing some releases.

BACK GROUND: In the backdrop of Russia Ukraine war, some Indians were recruited by the Russian army. Later they sought discharge. The Indian government says it intervened and secured the release of some individuals, while others are still waiting. There are concerns about the recruitment process and the treatment of these individuals.

ISSUES:

- The Indian Ministry of External Affairs (MEA) stated that several Indians previously recruited by the Russian army have been discharged.
- The MEA claims to have "strongly" addressed these issues with Russian authorities whenever they arose.
- However, the brother of a missing J&K recruit alleges unanswered calls and messages to the Indian embassy in Moscow.
- Reports suggest some Indians were hired as security helpers but ended up in the war zone, contradicting their expectations.
- Several individuals, including one injured during training, are seeking help from the Indian government to return home.

CONCLUSION: While some Indians secured discharge, the situation for others remains unclear, raising concerns about recruitment practices and communication.

POLITY AND GOVERNANCE

Grant permanent commission to women: SC to Coast Guard

CONTEXT: The Supreme Court on Monday urged the Indian Coast Guard to ensure that women are granted permanent commission. Mr. Venkataramani had pointed to functional and operational difficulties in granting permanent commissions to Short Service Commission Officers.



TYPES OF COMMISSIONING IN INDIAN ARMY

- **PERMANENT COMMISSION:** Career in the army till the age of retirement.
- **SHORT SERVICE COMMISSION:** Career in the army for 10 years, with the option to either leave, choose a 4-year extension or opt for Permanent Commission at the end of 10 years.

TIMELINE OF WOMEN IN ARMY

1992: WOMEN SPECIAL ENTRY SCHEME (WSES) – Commissioning of women for a period of 5 years in non-combat streams such as Army Education Corps, Corps of Signals, Intelligence Corps, and Corps of Engineers.

2006: SHORT SERVICE COMMISSION (SSC) SCHEME - Commissioning of women for a period of 10 years, extendable up to 14 years in non-combat streams (Army Postal Service, Judge Advocate General Department, Army Education Corps, Signal Corps, Intelligence Corps, Corps of Engineers, Corps of Electrical and Mechanical Engineering and Regiment of Artillery among other Corps). The first batch of women officers under the new scheme entered the Army in 2008.

JUDICIAL FIGHT FOR EQUALITY OF TREATMENT:

2006: Writ petitions filed in the Delhi High Court by Advocate Babita Puniya and several women SSC officers for Permanent Commission

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and equality of opportunity in women.

- **2008:** Delhi High Court held that women SSC officers of the Air Force and Army who had opted for PC, but not granted that status would be entitled to PC at par with male SSC officers with all consequential benefits.
- **2020:** The Supreme Court directed the Government to immediately grant Permanent Commission (PC) as well as command postings in all services other than combat for women officers in the Army.
- **2021:** On 25th March 2021, the Supreme Court in Lt. Col. Nitisha vs. Union of India Case held that the Army's selective evaluation process discriminated against and disproportionately affected women officers seeking permanent commission.
- **2022:** The Centre implemented Permanent Commission (PC) option to all eligible women Army officers.

BENEFITS OF PC: Full-time pension benefits and other allowances. In a landmark verdict on February 17, 2020, the Supreme court directed that women officers in the Army be granted a permanent commission, rejecting the Centre's stand on their "physiological limitations" as being based on "sex stereotypes" and "gender discrimination against women"

CURRENT STATUS

Grant of permanent commission to Short Service Commissioned (SSC) women officers is allowed in streams like Army Air Defence (AAD), Signals, Engineers, Army Aviation, Electronics and Mechanical Engineers (EME), Army Service Corps (ASC), Army Ordnance Corps (AOC), and Intelligence Corps in addition to the existing streams of Judge and Advocate General (JAG) and Army Educational Corps (AEC). Women officers still cannot serve in infantry, artillery and armoured corps—combat wings deployed at the most forward locations facing adversary situations. The Army has also tweaked its policy on issues like training, physical endurance and postings and service courses to bring about equilibrium in service conditions for male and female officers after the Supreme Court verdict.

INTERNATIONAL RELATIONS

Centre 'examining' Indian tech firm sanctioned by EU, U.S. for 'close ties' with Russian companies

CONTEXT: The European Union on Friday has sanctioned a Bengaluru-based high-tech firm Si2 Microsystems, an Indian tech company involved in semiconductor research for its dealings with Russia. On Friday, the EU's latest list named Si2 Microsystems India as "Entity number 620".

Under scanner

European Union's latest sanctions after the second anniversary of the Russia-Ukraine war have reached India

- Si2 Microsystems (Entity number 620) has been banned from transactions within EU for "dual-use" technological goods

- The firm had signed a collaboration with Ministry of Electronics and Information Technology (MeitY) and IIT-Madras for production of silicon chips in October 2023

- It had been in the bankruptcy courts on account of non-payment of debts; owner was on Lookout Circular in 2021 when he sought permission to travel to Russia



The company has been banned by the U.S. from "dual-use" technology transfers as well, and its directors had been placed on Lookout Circular (LOC) notices by Indian authorities over debt defaults. In November 2023, Si2 Microsystems had been added to the U.S.'s restricted "Entities List" for supplying "U.S.-origin integrated circuits" to the Russian military despite the transfers being banned after the Russian invasion of Ukraine, without the required licence.

The company is a partner of the Ministry of Electronics and Information Technology (MeitY) for a very recent "Atmanirbhar Bharat" (Make in India) collaboration. The company is an industry partner for a project to research fabrication of chips, that was announced in collaboration with Indian Institute of Technology-Madras, confirming the government tie-up that was announced by the Press Information Bureau last year.



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SCIENCE AND TECHNOLOGY

Modi to inaugurate three ISRO facilities today

CONTEXT: Prime Minister Narendra Modi will review the progress of the Gaganyaan human spaceflight programme and dedicate three facilities of the Indian Space Research Organisation (ISRO) to the nation during a visit to the Vikram Sarabhai Space Centre.

Mr. Modi is also likely to announce the names of the astronauts of the Gaganyaan programme, and will also bestow the 'mission patches' on them. Gaganyaan, expected to be launched in 2025, envisages a demonstration of human spaceflight capability by sending astronauts to orbit and returning them safely to the Earth.

Mr. Modi will dedicate the Trisonic Wind Tunnel established at the VSSC, integration facilities for the Polar Satellite Launch Vehicle (PSLV) set up at the Satish Dhawan Space Centre, Sriharikota, and the Semi-cryogenic Integrated Engine and Stage Test Facility (SIET) at the ISRO Propulsion Complex in Mahendragiri, Tamil Nadu. The three facilities have been developed at a cost of ₹1,800 crore.

The Trisonic Wind Tunnel has an overall length of 170 metres. With a test section size of 1.2 m, it produces a "controlled uniform airflow" over scale models of rockets and aircraft to assess their aerodynamic characteristics for optimal design development. The wind tunnel, which is the first of its kind in the country, has a Mach number range of 0.2 to 4, which means it can generate speeds ranging from subsonic to supersonic up to four times the speed of sound (Mach number 4). The tunnel will provide self-reliance in the end-to-end design of upcoming launch vehicle projects.

The new PSLV Integration Facilities (PIF) at Sriharikota will give the ISRO the capability to increase the number of PSLV missions in a year to 15. At the new facility, the PSLV rocket will be integrated parallelly with the refurbishment of the launch pad.

SIET will give the ISRO the capability to test the SCE-2000 semi-cryogenic engine which uses refined kerosene (named ISROSENE) and liquid oxygen as propellants and the rocket stage. The facility is at the ISRO Propulsion Complex in Mahendragiri.

almost three times.

The Indian data would help to provide appropriate care for pregnant women and determine the precise date of birth, thus reducing maternal and infant mortality rates. The advanced data science and AI/ML techniques were used to build tools to predict unfavourable birth outcomes and the first step is to develop accurate GA models that perform significantly better than currently used models designed using western populations.

INTERNATIONAL RELATIONS

India seeks permanent solution to public food stockpile issue at WTO meet

CONTEXT: India called on WTO members to find a permanent solution to the long-pending public food stockpile issue, saying it is directly related to achieving the sustainable development goal of zero hunger by 2030.

Trade ministers of 164 WTO-member countries are gathering in Abu Dhabi for the 13th Ministerial Conference (MC13). Piyush Goyal noted the World Trade Organisation (WTO) to not negotiate rules on non-trade-related subjects like climate change, gender, and labour and rather these should be addressed in respective intergovernmental organizations. The development agenda would remain incomplete without a permanent solution on public stockholding (PSH) for food security purposes which is directly related to achieving the Sustainable Development Goal of Zero Hunger by 2030. The Public Stock Holding (PSH) continues to be a long-pending issue for the last few decades and despite having a clear mandate agreed by the members in the past, finding a permanent solution on PSH remains an unaccomplished agenda on which we have to deliver in MC13.

INTERNATIONAL RELATIONS

Old beginning

CONTEXT: Pakistan's recent elections brought a hung parliament, with PTI leading independents and PML-N forming a coalition government. This creates political instability amidst a severe economic crisis.

BACKGROUND: Shehbaz Sharif, Pakistan's new Prime Minister, faces a challenging term. He leads a coalition formed after controversial elections, inherits a struggling economy with high inflation and debt, and must navigate a complex political landscape with a strong opposition and security concerns.

ISSUES:

- **Controversial Elections:** Pakistan's recent elections were disputed, with the PTI (former PM Imran Khan's party) barred from using its symbol and accusing the military of rigging.
- **Coalition Government Formed:** PML-N (Shehbaz Sharif) led a coalition with PPP, excluding PTI, despite the latter winning the most individual seats.
- **Sharif Faces Challenges:** Shehbaz Sharif faces a difficult term due to:

SCIENCE AND TECHNOLOGY

India-specific AI model to find gestational age developed

CONTEXT: Researchers have developed an India-specific artificial intelligence model to precisely determine the gestational age of a foetus in the second and third trimester of pregnancy.

The model has been designed by researchers at the Indian Institute of Technology-Madras and the Translational Health Science and Technology Institute, Faridabad. It is part of an interdisciplinary group for advanced research on birth outcomes — DBT India initiative (GARBH-Ini) programme.

The Garbhini-GA2 is the first late-trimester GA estimation model to be developed and validated using Indian population data. Currently models used for Western population are in use which could prove erroneous when applied in the later part of pregnancy due to variations in the growth of the foetus in the Indian population. The Garbhini-GA2 accurately estimates the foetus' age, reducing error by

- **Economic Crisis:** High inflation, heavy debt, and need for IMF bailout.
- **Political Instability:** Strong opposition (PTI) and potential for unrest.
- **Security Concerns:** Growing issues in the Afghan border region.
- **Uncertain Future:** Sharif's ability to navigate these challenges and fulfill his promises is unclear

CONCLUSION: Despite leading a coalition with military backing, Shehbaz Sharif faces a daunting task. He inherits a struggling economy, a fractured political landscape, and ongoing security concerns. Navigating these challenges while meeting public expectations for change will be a significant test of his leadership.

POLITY AND GOVERNANCE

Everything In The Garden Of Elections Is Not Lovely

CONTEXT: The Supreme Court's recent judgment in the Chandigarh mayoral election case, where it overturned the results due to tampering, raises concerns about the future of India's democracy, especially in the context of upcoming national elections and the increasing presence of religion in political discourse.

MAJOR ISSUES:

- **Supreme Court upholds free and fair elections:** The court emphasizes the importance of free and fair elections in the Chandigarh mayoral election case.
- **Concerns about upcoming national elections:** The Chandigarh case raises concerns about potential manipulation in the upcoming national elections.
- **Religious fervour and political campaigning:** The rise of religious fervor in India is seen as a potential threat to the integrity of the electoral process.
- **Political parties and religious appeals:** Political parties are cautioned against using religion in their campaigns, as it is considered a corrupt practice.
- **Vulnerability of the electoral process:** The Chandigarh case highlights the vulnerability of the electoral process at different stages, even during vote counting.
- **Public apprehension and hope:** The public is apprehensive about the future of democracy, but finds hope in the Supreme Court's intervention.

POLITICAL DISCOURSE NOW

1. Importance of the 2024 Elections:

- India's general election is crucial for its democratic history and global image as a beacon of secularism.
- Concerns exist regarding a potential shift towards a theocratic system due to rising religiosity and its influence in political discourse.

2. Incident in Chandigarh:

- A Returning Officer (affiliated with the BJP) allegedly invalidated valid votes favoring a rival candidate, highlighting potential manipulation within the electoral system.
- The Supreme Court, recognizing the incident's significance,

intervened to ensure the integrity of the electoral process.

3. The Court's Response:

- The Supreme Court condemned the Returning Officer's actions and emphasized its responsibility to protect electoral democracy (Article 142 of the Constitution).
- Highlighting the danger to the system, the Court's observations serve as a warning against future attempts to subvert elections.

4. Alarming Trends:

- The incident raises concerns about the willingness of officials to manipulate elections and the ability of the current system to prevent it, even with legal protections.
- The defense of the Returning Officer by government officials and the High Court's initial inaction further raise concerns.

5. Importance of Upholding Electoral Integrity:

- India's founding principles and legal framework emphasize the sanctity of the electoral system, which the Supreme Court has consistently upheld.
- Judicial vigilance in punishing electoral manipulation and upholding the system's integrity is crucial to maintain public trust.
- The recent Supreme Court judgments on electoral bonds and the Chandigarh elections are widely appreciated for their role in maintaining electoral integrity.

6. The Challenge of Religious Fervor:

- With heightened religious fervor in the country, the upcoming elections face the challenge of ensuring the secular Constitution and legal system can safeguard the integrity of the electoral process.
- The ability to protect against manipulation based on religious sentiment remains a key question for Indian citizens.

THE ANGLE OF RELIGION IN INDIAN ELECTIONS

1. Religious Appeals and the Law:

- Political parties often resort to religious rhetoric during elections, despite it being a corrupt practice under Section 123(3) of the Representation of the People Act, 1951.
- This provision recognizes the vulnerability of voters to religious appeals and aims to ensure fair elections.
- The Supreme Court has repeatedly condemned the use of religion in campaigning, citing cases like Ziyauddin Burhanuddin Bukhari vs Brijmohan Ramdass Mehra & Ors (1975), and Abhiram Singh vs C.D. Commachen (2017).

2. Importance of Adhering to Legal Precedents:

- Political parties should familiarize themselves with these judgments to avoid utilizing religious appeals during campaigns.
- This is crucial for maintaining a secular and democratic election process in India.

3. The Chandigarh Incident:

- The manipulation of votes by the Returning Officer in Chandigarh highlights the potential for subversion at various stages of the election process.
- Even though local body elections like this one aren't governed by the Representation of the People Act, similar principles of fair and free elections apply under corporation regulations.

4. Concerns and Hope:

- The Chandigarh episode raises serious concerns about the future of India's electoral democracy.

- However, the Supreme Court's intervention in this case provides a sense of hope for safeguarding the electoral process.

5. A Call for Vigilance:

- After 75 years of democratic elections, witnessing attempts to manipulate the system is alarming.
- Citizens must remain vigilant and ensure such practices don't become the norm in future elections.

CONCLUSION: The upcoming elections in India present a critical test for its democracy. While the Supreme Court's recent intervention offers hope, concerns persist about religious influence and potential manipulation. Ensuring free and fair elections, upholding secular principles, and maintaining public trust will be crucial for India's democratic future.

INTERNATIONAL RELATIONS

Russia's Economy After Two Years Of War

CONTEXT: Two years after invading Ukraine, Russia's economy shows surprising resilience despite crippling sanctions, with the war itself driving growth due to high energy prices and war spending.

THE GIST

- A formal cap has been imposed on buying or processing Russian oil sold for more than \$60 per barrel. And in theory, it is illegal to sell Russia anything that could be used by the military.
- Despite all of this, Russia's economy has not collapsed. In fact, it is now entirely focused on a long war in Ukraine — which is actually driving economic growth. The IMF expects Russia to experience GDP growth of 2.6% this year.
- Military pay, ammunition, tanks, planes, and compensation for dead and wounded soldiers, all contribute to the GDP figures. Put simply, the war against Ukraine is now the main driver of Russia's economic growth. And it is a war that Russia cannot afford to win. The cost of rebuilding and maintaining security in a conquered Ukraine would be too great.

MAJOR ISSUES

Russia's Surprising Economic Resilience: Two Years after the Invasion

Crippling Sanctions, Yet No Collapse:

- Despite unprecedented sanctions, Russia's economy has not collapsed, but faces a 7% GDP decline compared to pre-war forecasts.

Wartime Economy:

- The war itself drives Russia's economic growth due to high energy prices and war spending, with 40% of the budget allocated to the war effort.
- Military spending is expected to reach 10% of GDP, far exceeding the UK's 2.3%.

Central Bank and Government Measures:

- Russia's strong centralized bank implemented high interest rates (16%) and capital controls to prevent the ruble's collapse.

Sidestepping Sanctions:

- Russia utilizes a "dark" oil fleet and other loopholes to circumvent

oil cap restrictions, continuing to receive high oil revenue.

- Some countries, like Turkey and China, reportedly circumvent sanctions by selling goods to Russia.

The Perilous Paradox:

- Russia cannot afford a decisive victory due to the immense cost of rebuilding and maintaining control over Ukraine.
- A protracted stalemate might be the only way for Russia to avoid economic collapse, but this creates a long and costly conflict.

Lost Ground:

- Resource-rich Russia experiences lower economic standards compared to former Soviet neighbors who embraced European integration.

No Easy Exit:

- The Russian government lacks incentive to end the war and face the harsh economic reality, creating a seemingly intractable situation.

CONCLUSION: Despite enduring sanctions, Russia's war-fueled economy shows surprising resilience, albeit with a smaller GDP. However, the high cost of a potential victory creates a perilous paradox. A drawn-out conflict, while preventing economic collapse, becomes a costly and seemingly intractable situation, leaving Russia in a weaker position compared to its former Soviet neighbours.

INTERNATIONAL RELATIONS

What Is The Latest Row Between Trump And Nato?

CONTEXT: Tensions rise within NATO as former US president Trump threatens to withdraw support over European allies' failure to meet defense spending targets, raising concerns about the alliance's future unity and strength against Russia.

THE GIST

- Former U.S. President Donald Trump threatened to withdraw support to NATO citing the failure of European NATO allies to step up their defence expenditure.
- While direct funding of €3.8 billion as required by the 2024 budget has been fulfilled by the members to continue NATO operations and military commands, equal contribution to indirect funding is a long-standing problem.
- The US has been the major shareholder of NATO's defence. Although its GDP spending ranged between high and low tendencies, losing its support entirely would take decades for NATO to revive its military arsenal.

THE STORY SO FAR:

Former President Trump threatened NATO withdrawal due to European defense spending failures, prompting NATO Secretary General Stoltenberg to stress the importance of alliance solidarity, amid challenges for President Biden's Ukraine aid bill in Congress.

THE ISSUE:

1. Trump has consistently pressed NATO allies to increase defense spending during his presidency.
2. His advisors proposed a 'tiered alliance' to modify Articles 3 and

5, linking defense spending to protection under NATO.

- The issue persists despite members fulfilling direct funding requirements for NATO operations.
- The U.S. contributes significantly to indirect funding, highlighting ongoing disparities.

NATO'S RESPONSE:

Stoltenberg's Assertion at Munich Security Conference:

- Stoltenberg asserts NATO's superiority over Russia citing July 2023 defense expenditure report.
- NATO's strength lies in military personnel, collective capabilities, and naval power, overshadowing Russia.
- However, Russia surpasses NATO in ground combat vehicles and nuclear warheads.

Historical Context of NATO Spending:

- U.S. historically the largest NATO contributor since 1949.
- In 2006, a 2% GDP target for defense spending introduced.
- Actual spending increased post-Russia's 2014 Ukraine invasion.
- Few nations maintained or increased GDP share from 2006-2014 (Norway, Poland, Estonia, Albania).
- European allies and Canada pledged \$600 billion post-2014 invasion but haven't met the threshold yet.

Current European Pledges and Strategies:

- European NATO members commit \$380 billion this year, aiming for 2% GDP defence spending.
- Germany and Finland pledge to increase military expenditure.
- Emphasis on bolstering Europe's defence capabilities internally and reducing reliance on the U.S.

What happens if Mr. Trump withdraws support from NATO?

Severe Consequences of Trump's Withdrawal:

- NATO risks losing military support from the U.S.
- A united front against Russia could crumble, weakening NATO's stance.

Decades to Replace U.S. Military Contribution:

- U.S. has been a major contributor to NATO's defence.
- It would take decades to replace U.S. military support.
- NATO's military arsenal revival would be a prolonged process.

Leadership Ambiguity and European Security:

- Questions arise regarding leadership post-U.S. withdrawal.
- Ambiguity persists over who can lead NATO.
- Establishment of a Europe-led security bloc raises leadership uncertainties.

CONCLUSION: Escalating tensions between Trump and NATO highlight critical challenges for alliance cohesion and countering Russian aggression. Responses underscore complexities of maintaining solidarity. With potential U.S. withdrawal, leadership questions emerge, emphasizing the need for NATO to address underlying issues and reaffirm collective defence commitment for continued relevance.

SCIENCE AND TECHNOLOGY

Will 'colour molecules' make quantum computers accessible?

CONTEXT: A classical computer is a collection of information storage units called bits. These physical devices have two states each, denoted 0 and 1. Any computation that a computer performs is essentially the result of the manipulation of the states of bits.

A qubit is a physical system with two quantum states, and it is the fundamental physical component of a quantum computer. A qubit can exist in one of the two states or — unlike classical computers — a superposed state with contributions from both states.

This superposition is a quantum feature that the bits in conventional computers don't exhibit. Superposed states, also known as coherent superpositions, are important in quantum information-processing protocols. However, superpositions are fragile. The fragility arises out of the interaction between the qubit and other systems. The more the number of interaction channels, the faster the superposition "decoheres" and the qubit ends up in one of the two states.

Many qubits, one problem

A collection of qubits is required to make a quantum device.

The qubits should be identical. The qubits can't be guaranteed to be identical since they need to be manufactured, and some 'imperfections' will creep in.

The qubits should be relatively easy to integrate several qubits that can be operated controllably. Here, controllability refers to both the manipulation of individual qubits (a.k.a. "addressability") and qubit-qubit interactions. An important, related aspect is the qubit system should be robust enough to function at room temperature without losing quantum features for reasonably long durations.

Many different physical systems are suitable for realising qubits. Some well-studied and practical options include superconducting junctions, trapped ions, and quantum dots. However, all these systems can operate as qubits only at very low temperatures or in a high vacuum or both.

In some cases, like superconducting junctions, a low temperature is in fact essential for them to work as qubits. In other cases, a low temperature is required for quantum features like superposition to survive for longer in the computer.

Commercial viability

As a result, quantum computers based on such technologies are expensive. Researchers are working on alternative, simpler technologies to reduce costs. Less expensive technologies will allow more participation in this research frontier. If a technology is not economically viable, it is not easy to sustain it long enough for breakthroughs to happen.

In a recent collaborative study reported in the journal *Science Advances* by a group of institutions in Japan, researchers realised qubits at room temperature in a metal-organic framework (MOF).

A MOF is a network of repeated molecular arrangements where the repeating structure has a metal atom or ion with organic molecules attached to it like tentacles. Each tentacle attaches to another metal atom, and the structure repeats itself to make up the

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The 'colour molecules'

In the system studied by the Japanese team, zirconium is the metal component and an organic molecule containing the chromophore pentacene bridges the metal atoms. A chromophore is an organic molecule or a part of a larger molecule that absorbs light of some specific colour. An object containing such molecules thus appears to have some dominant colour. For example, the leaves of many plants appear green since the chromophore chlorophyll predominantly absorbs red and blue colours from sunlight. Since the presence of chromophores is responsible for the colouration, they are also called "colour molecules". When it absorbs light, the chromophore molecule jumps to a higher energy level (i.e. an excited state).

In its lowest energy state, or ground state, a chromophore molecule has a pair of electrons in a special configuration called a singlet. Every electron possesses a property called spin that is inherent to it. The spin of an electron can point in two opposite directions, each corresponding to a distinct quantum state.

In a singlet, the spins of the two electrons are pointing in opposite directions. If we say 'pointing up' is +1 and 'pointing down' is -1, we can say the spins in a singlet add up to zero. When the chromophore molecule absorbs some light, one of the electrons moves to a higher energy level while their respective spins still point in opposite directions.

Imagine the energy levels to be like steps, often unequally spaced, of a ladder. Excitation amounts to climbing up the ladder. If two electrons, one on a lower rung of the ladder and another on a higher rung, have their spins pointing in opposite directions, it is a singlet excited state. If the two electrons are on different steps of the energy ladder and have their spins in the same direction (say, +1 and +1), the configuration would be called a triplet excited state.

Role of singlet fission

An excited molecular system has a small but non-zero chance of releasing its extra energy in a process called deexcitation. The higher energy singlet excited state can deexcite to a lower energy triplet excited state. The energy released in the process will excite a neighbouring chromophore molecule in a singlet ground state to jump to a triplet excited state.

This process of generating two triplet excited chromophores from a singlet excited state chromophore is called singlet fission. This energy transfer happens as the two chromophores interact.

The MOF networks are very porous, like sponges, allowing the chromophores to rotate by a small degree. The rotation leads to a change in the interaction strength between two adjacent chromophores.

The triplet state of one of the chromophores involves two of its energy levels (recall the ladder-rung analogy), and that of the other chromophore involves two energy levels in its own energy ladder. The interaction between the chromophores prepares the two pairs of electrons in a superposition wherein each pair is in a triplet state. The rotation-induced modulation also seems to play a role in ensuring the superposition of triplet states generated by singlet fission is long-lived.

A necessary first step

In simpler terms, the interaction between the

chromophores is strong enough to cause singlet fission but weak enough to not allow the coherence to be lost once the triplets form. In their experiment, the Japanese team found that even at room temperature, the coherence of the superposition of two four-electron states survived up to a fraction of a microsecond, which is a long duration in the current context. Other qubit systems require an extremely low temperature if coherence has to last this long.

It remains to be seen whether researchers can demonstrate how to achieve quantum gate operations on these qubits, assemble several qubits, and achieve controllability. Nevertheless, the availability of room-temperature qubits is a significant achievement that will invite many research groups to explore the system further.

INTERNATIONAL RELATIONS

Record drop in Suez Canal transits due to Houthis' attacks

CONTEXT: Attacks by the Houthis in the Red Sea are disrupting global trade, with ships rerouting around Africa instead of using the Suez Canal, causing longer journeys, higher costs, and impacting various regions like India.

MAJOR ISSUES :

Houthi Attacks Disrupt Global Trade via Red Sea

1. Cause of Disruption:

- Since November 2023, Houthi attacks in the Red Sea are forcing ships to reroute around Africa's Cape of Good Hope, instead of using the Suez Canal.
- This disrupts trade flow between Asia and Europe, as the Suez Canal is a critical waterway.

2. Impact on Shipping:

- Container tonnage through the Suez Canal plummeted by 82% in the first half of February 2024 compared to the same period before the attacks.
- Conversely, container tonnage around the Cape of Good Hope surged by 60% during the same period.
- Over 620 container ships have been rerouted around the Cape of Good Hope since the attacks began.

3. The Panama Canal's Challenges:

- Adding to the disruption, the Panama Canal is experiencing lower capacity due to drought, leading to fewer transits.

4. Increased Distances and Costs:

- Rerouting around Africa significantly increases travel distances, for example, an oil tanker journey from Saudi Arabia to the Netherlands nearly doubles in distance.
- This translates to higher shipping costs, with container freight rates rising significantly, particularly for Asia-Europe routes.

5. Impact on India:

- India, which imports oil from Russia via the Suez Canal, is also affected.
- While domestic fuel prices haven't been impacted yet, India's growing petroleum product exports to Europe would be

significantly affected without the Suez Canal route due to increased costs.

CONCLUSION: The Houthi attacks in the Red Sea are causing a ripple effect, disrupting global trade, increasing shipping costs,

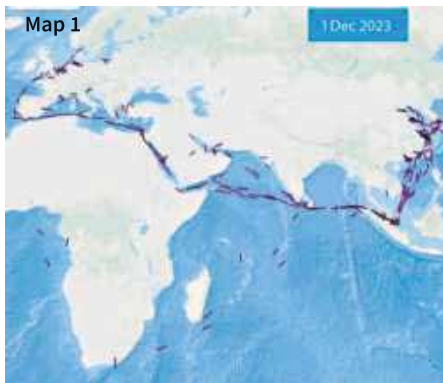
and impacting countries like India. Urgent solutions are needed to ensure the safe passage of vessels and mitigate the economic consequences.

Stormy seas

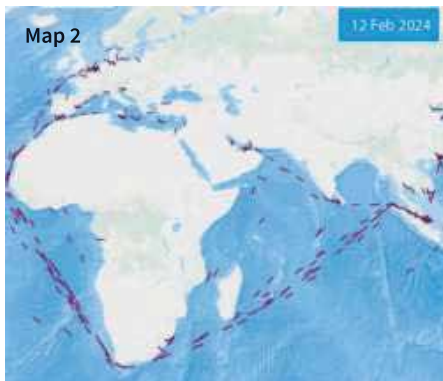
The charts were sourced from the UNCTAD report titled “Navigating troubled waters”



Map 1 & 2: The maps show how the container ships shifted from the Suez Canal route to the Cape of Good Hope route after the attacks



The small rectangles in the maps correspond to containers. Map not to scale.



An oil tanker starting from the port of Ras Tanura in Saudi Arabia to Rotterdam in the Netherlands will have to travel 10,358 km in total, if it chooses the Suez Canal route. The alternative journey around the Cape of Good Hope would be 17,975 km

Chart 3: The chart shows the number of monthly transits in the Suez and Panama Canals from October 2021 to January 2024

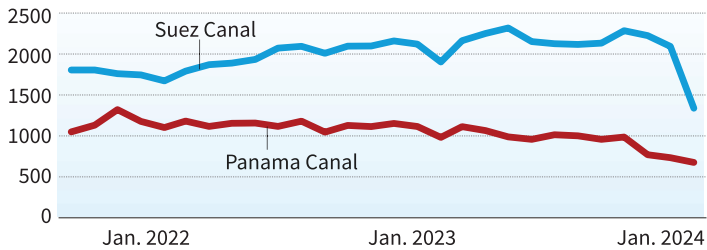


Chart 4: The chart shows the average distance travelled in nautical miles every year by various types of cargo containers

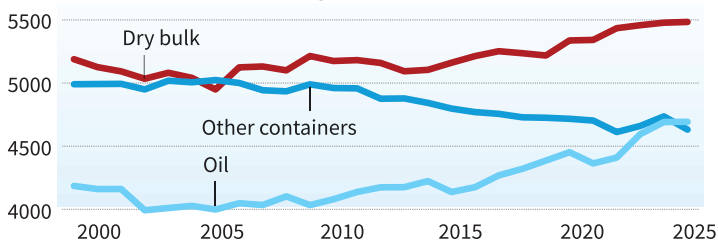
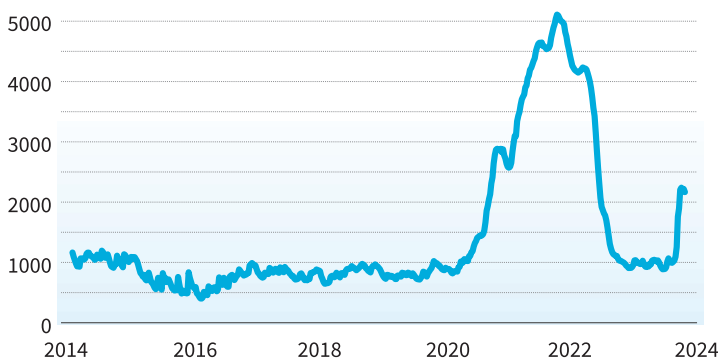


Chart 5: The chart shows container freight rates from February 2014 to February 2024 in dollars per container per shipment





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