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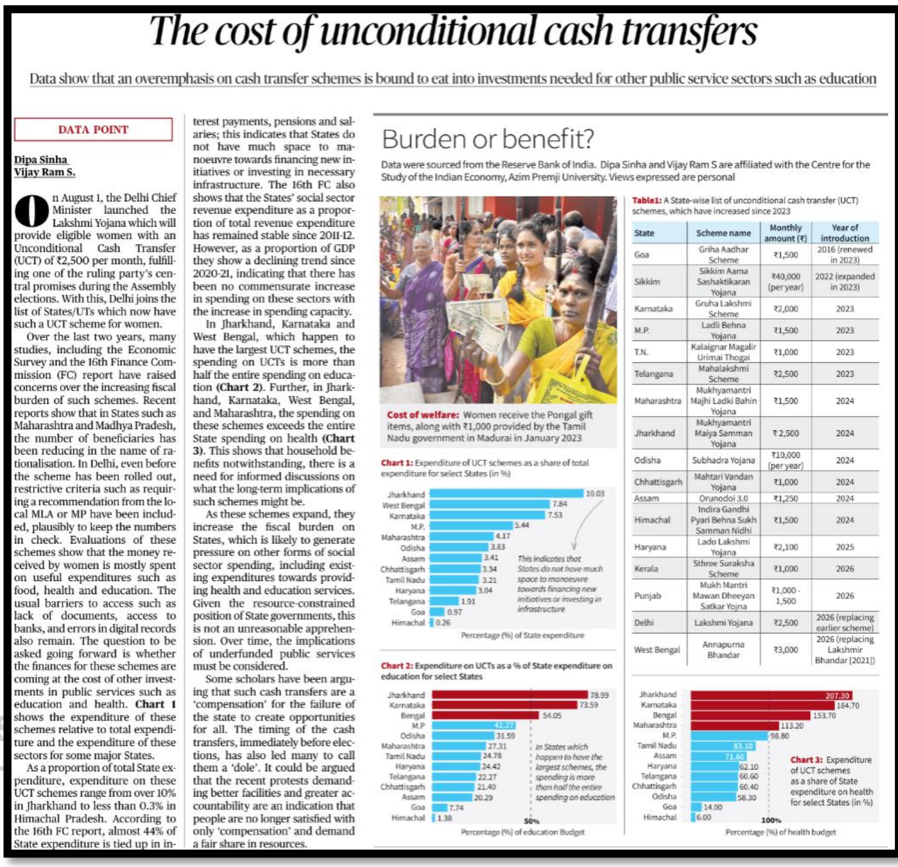
Page 09: GS II : Social Justice / Preliminary Examination

Unconditional Cash Transfer (UCT) schemes targeting women, such as Delhi's **Lakshmi Yojana** (offering ₹2,500/month), have expanded rapidly across Indian states. While intended for direct welfare and women's empowerment, recent reports, including the Economic Survey and the 16th Finance Commission, highlight growing concerns over their fiscal sustainability and impact on public services.



The cost of unconditional cash transfers

Data show that an overemphasis on cash transfer schemes is bound to eat into investments needed for other public service sectors such as education

DATA POINT

Dipa Sinha
Vijay Ram S.

On August 1, the Delhi Chief Minister launched the Lakshmi Yojana which will provide eligible women with an Unconditional Cash Transfer (UCT) of ₹2,500 per month, fulfilling one of the ruling party's central promises during the Assembly elections. With this, Delhi joins the list of States/UTs which now have such a UCT scheme for women.

Over the last two years, many studies, including the Economic Survey and the 16th Finance Commission (FC) report have raised concerns over the increasing fiscal burden of such schemes. Recent reports show that in States such as Maharashtra and Madhya Pradesh, the number of beneficiaries has been reducing in the name of rationalisation. In Delhi, even before the scheme has been rolled out, restrictive criteria such as requiring a recommendation from the local MLA or MP have been included, plausibly to keep the numbers in check. Evaluations of these schemes show that the money received by women is mostly spent on useful expenditures such as food, health and education. The usual barriers to access such as lack of documents, access to banks, and errors in digital records also remain. The question to be asked going forward is whether the finances for these schemes are coming at the cost of other investments in public services such as education and health. **Chart 1** shows the expenditure of these schemes relative to total expenditure and the expenditure of these sectors for some major States.

As a proportion of total State expenditure, expenditure on these UCT schemes range from over 10% in Jharkhand to less than 0.3% in Himachal Pradesh. According to the 16th FC report, almost 44% of State expenditure is tied up in interest payments, pensions and salaries; this indicates that States do not have much space to manoeuvre towards financing new initiatives or investing in necessary infrastructure. The 16th FC also shows that the States' social sector revenue expenditure as a proportion of total revenue expenditure has remained stable since 2011-12. However, as a proportion of GDP they show a declining trend since 2020-21, indicating that there has been no commensurate increase in spending on these sectors with the increase in spending capacity.

In Jharkhand, Karnataka and West Bengal, which happen to have the largest UCT schemes, the spending on UCTs is more than half the entire spending on education **(Chart 2)**. Further, in Jharkhand, Karnataka, West Bengal, and Maharashtra, the spending on these schemes exceeds the entire State spending on health **(Chart 3)**. This shows that household benefits notwithstanding, there is a need for informed discussions on what the long-term implications of such schemes might be.

As these schemes expand, they increase the fiscal burden on States, which is likely to generate pressure on other forms of social sector spending, including existing expenditures towards providing health and education services. Given the resource-constrained position of State governments, this is not an unreasonable apprehension. Over time, the implications of underfunded public services must be considered.

Some scholars have been arguing that such cash transfers are a 'compensation' for the failure of the state to create opportunities for all. The timing of the cash transfers, immediately before elections, has also led many to call them a 'dole'. It could be argued that the recent protests demanding better facilities and greater accountability are an indication that people are no longer satisfied with only 'compensation' and demand a fair share in resources.

Burden or benefit?

Data were sourced from the Reserve Bank of India. Dipa Sinha and Vijay Ram S are affiliated with the Centre for the Study of the Indian Economy, Azim Premji University. Views expressed are personal

Cost of welfare: Women receive the Pongal gift items, along with ₹1,000 provided by the Tamil Nadu government in Madurai in January 2023

Table1: A State-wise list of unconditional cash transfer (UCT) schemes, which have increased since 2023

State	Scheme name	Monthly amount (₹)	Year of introduction
Goa	Griha Aadhar Scheme	₹1,500	2016 (renewed in 2023)
Sikkim	Sikkim Aama Sashaktikaran Yojana	₹40,000 (per year)	2022 (expanded in 2023)
Karnataka	Gruha Lakshmi Scheme	₹2,000	2023
M.P.	Ladli Behna Yojana	₹1,500	2023
T.N.	Kalaignar Magalir Urimai Thogai	₹1,000	2023
Telangana	Mahalakshmi Scheme	₹2,500	2023
Maharashtra	Mukhyamantri Majhi Ladki Bahin Yojana	₹1,500	2024
Jharkhand	Mukhyamantri Maiya Samman Yojana	₹ 2,500	2024
Odisha	Subhadra Yojana	₹10,000 (per year)	2024
Chhattisgarh	Mahtari Vandan Yojana	₹1,000	2024
Assam	Orunodoi 3.0	₹1,250	2024
Himachal	Indira Gandhi Pyari Behna Sukh Samman Nidhi	₹1,500	2024
Haryana	Lado Lakshmi Yojana	₹2,100	2025
Kerala	Sthree Suraksha Scheme	₹1,000	2026
Punjab	Mukh Mantri Mawan Dheeyan Satkar Yojna	₹1,000 - 1,500	2026
Delhi	Lakshmi Yojana	₹2,500	2026 (replacing earlier scheme)
West Bengal	Annapurna Bhandar	₹3,000	2026 (replacing Lakshmir Bhandar [2021])

Chart 1: Expenditure of UCT schemes as a share of total expenditure for select States (in %)

Chart 2: Expenditure on UCTs as a % of State expenditure on education for select States

Chart 3: Expenditure of UCT schemes as a share of State expenditure on health for select States (in %)

Key Analysis: The Cost of Unconditional Cash Transfers

- **Fiscal Crowding Out:** High outlays on UCTs (exceeding 10% of total state expenditure in states like Jharkhand) divert limited financial resources away from essential public sectors like health and education. In several states, spending on UCTs exceeds the total health allocation.

- **Constrained State Finances:** Committed expenditure (salaries, pensions, and interest payments) accounts for ~44% of total state spending. Adding large, recurring UCT obligations restricts state fiscal space for capital formation and human capital development.

- **Implementation & Access Barriers:** Administrative hurdles—such as requiring recommendations from local legislators, documentary deficits, and bank account errors—often exclude the intended beneficiaries.

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- **Declining Social Sector Spending Relative to GDP:** Despite growing budget sizes, social sector revenue expenditure as a percentage of GDP has shown a declining trend since 2020-21, indicating a lag in state capacity investments.
- **Structural Dependency vs. Capacity Building:** Cash transfers act as short-term income support but do not replace public infrastructure, quality schooling, healthcare, or sustainable job creation.

Related Static Dimensions

- **Governance & Welfare Schemes:** Direct Benefit Transfer (DBT) mechanism, social security architecture, rights-based vs. dole-based welfare, and gender-responsive budgeting.
- **Indian Economy & Fiscal Federalism:** Fiscal consolidation, revenue deficit, 16th Finance Commission awards, state government debt dynamics, and quality of public expenditure (Capital vs. Revenue).

Conclusion & Way Forward

While unconditional cash transfers provide immediate relief and foster individual choice, relying solely on cash doles without expanding core public infrastructure risks weakening long-term human development outcomes. States must strike a balanced approach by combining targeted cash safety nets with robust investments in public healthcare, quality education, and employment opportunities.

UPSC Prelims Practice Questions

Question: Which of the following could constitute crowding out due to large recurring welfare expenditure?

A. Increase in private investment due to better infrastructure.

B. Reduction in government resources available for capital expenditure and human-capital investment because of rising committed welfare expenditure.

C. Increase in tax revenues following economic growth.

D. Increase in exports due to higher productivity.

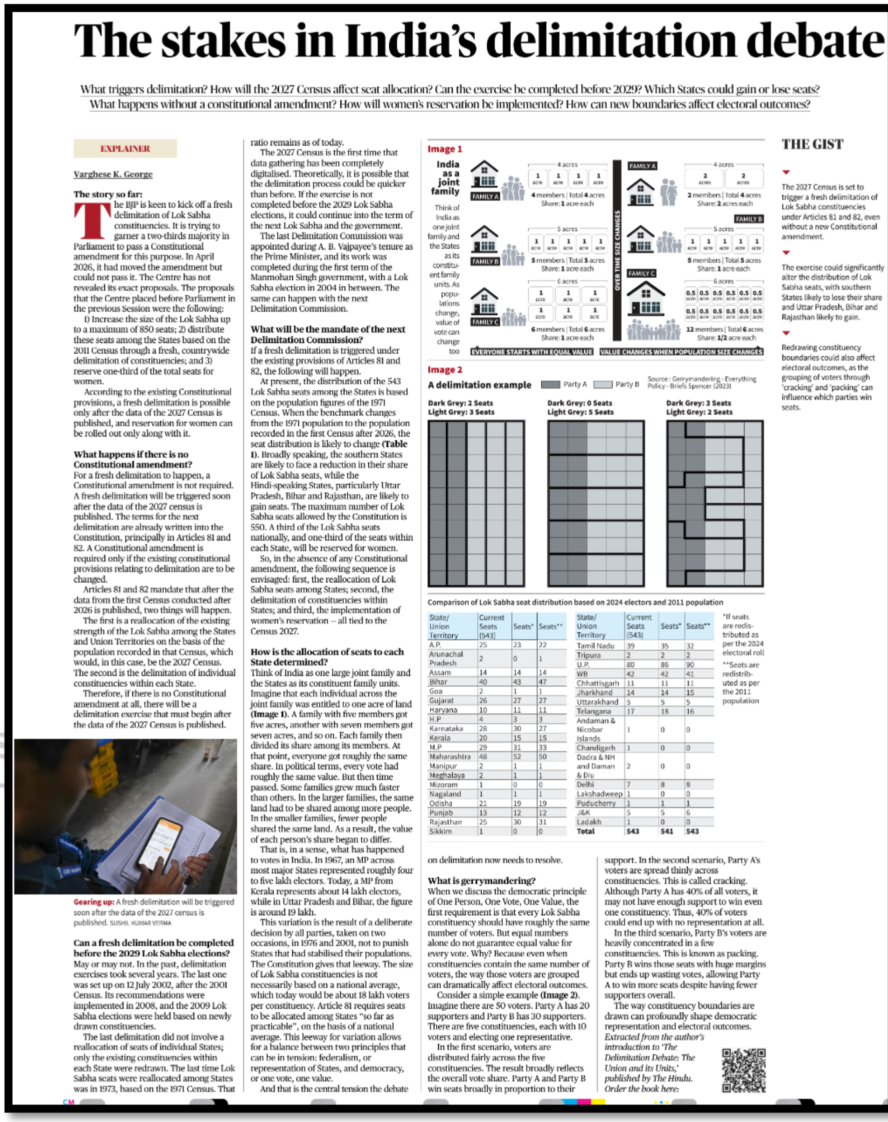
Ans: B)

UPSC Mains Practice Questions

Question: "Unconditional cash transfers can enhance women's economic agency, but they cannot substitute for investments in public health, education and employment." Critically examine. **(10 Marks, 150 Words)**

Page 10 :GS II : Indian Polity / Preliminary Examination

The upcoming delimitation exercise represents a critical constitutional milestone in India's democratic structure. Triggered by the forthcoming 2027 Census data, it brings into sharp focus the conflict between democratic representation based on population and federal balance among States.



The stakes in India's delimitation debate

What triggers delimitation? How will the 2027 Census affect seat allocation? Can the exercise be completed before 2029? Which States could gain or lose seats? What happens without a constitutional amendment? How will women's reservation be implemented? How can new boundaries affect electoral outcomes?

EXPLAINER

Varghese K. George

The story so far:

The BJP is keen to kick off a fresh delimitation of Lok Sabha constituencies. It is trying to garner a two-thirds majority in Parliament to pass a Constitutional amendment for this purpose. In April 2026, it had moved the amendment but could not pass it. The Centre has not revealed its exact proposals. The proposals that the Centre placed before Parliament in the previous Session were the following:

1) Increase the size of the Lok Sabha up to a maximum of 850 seats; 2) distribute these seats among the States based on the 2011 Census through a fresh, countrywide delimitation of constituencies; and 3) reserve one-third of the total seats for women.

According to the existing Constitutional provisions, a fresh delimitation is possible only after the data of the 2027 Census is published, and reservation for women can be rolled out only along with it.

What happens if there is no Constitutional amendment?

For a fresh delimitation to happen, a Constitutional amendment is not required. A fresh delimitation will be triggered soon after the data of the 2027 census is published. The terms for the next delimitation are already written into the Constitution, principally in Articles 81 and 82. A Constitutional amendment is required only if the existing constitutional provisions relating to delimitation are to be changed.

Articles 81 and 82 mandate that after the data from the first Census conducted after 2026 is published, two things will happen.

The first is a reallocation of the existing strength of the Lok Sabha among the States and Union Territories on the basis of the population recorded in that Census, which would, in this case, be the 2027 Census. The second is the delimitation of individual constituencies within each State.

Therefore, if there is no Constitutional amendment at all, there will be a delimitation exercise that must begin after the data of the 2027 Census is published.

Gearing up: A fresh delimitation will be triggered soon after the data of the 2027 census is published. SUSHIL KUMAR VERMA

Can a fresh delimitation be completed before the 2029 Lok Sabha elections?

May or may not. In the past, delimitation exercises took several years. The last one was set up on 12 July 2002, after the 2001 Census. Its recommendations were implemented in 2008, and the 2009 Lok Sabha elections were held based on newly drawn constituencies.

The last delimitation did not involve a reallocation of seats of individual States; only the existing constituencies within each State were redrawn. The last time Lok Sabha seats were reallocated among States was in 1973, based on the 1971 Census. That ratio remains as of today.

The 2027 Census is the first time that data gathering has been completely digitalised. Theoretically, it is possible that the delimitation process could be quicker than before. If the exercise is not completed before the 2029 Lok Sabha elections, it could continue into the term of the next Lok Sabha and the government.

The last Delimitation Commission was appointed during A. B. Vajpayee's tenure as the Prime Minister, and its work was completed during the first term of the Manmohan Singh government, with a Lok Sabha election in 2004 in between. The same can happen with the next Delimitation Commission.

What will be the mandate of the next Delimitation Commission?

If a fresh delimitation is triggered under the existing provisions of Articles 81 and 82, the following will happen.

At present, the distribution of the 543 Lok Sabha seats among the States is based on the population figures of the 1971 Census. When the benchmark changes from the 1971 population to the population recorded in the first Census after 2026, the seat distribution is likely to change **(Table 1)**. Broadly speaking, the southern States are likely to face a reduction in their share of Lok Sabha seats, while the Hindi-speaking States, particularly Uttar Pradesh, Bihar and Rajasthan, are likely to gain seats. The maximum number of Lok Sabha seats allowed by the Constitution is 550. A third of the Lok Sabha seats nationally, and one-third of the seats within each State, will be reserved for women.

So, in the absence of any Constitutional amendment, the following sequence is envisaged: first, the reallocation of Lok Sabha seats among States; second, the delimitation of constituencies within States; and third, the implementation of women's reservation – all tied to the Census 2027.

How is the allocation of seats to each State determined?

Think of India as one large joint family and the States as its constituent family units. Imagine that each individual across the joint family was entitled to one acre of land **(Image 1)**. A family with five members got five acres, another with seven members got seven acres, and so on. Each family then divided its share among its members. At that point, everyone got roughly the same share. In political terms, every vote had roughly the same value. But then time passed. Some families grew much faster than others. In the larger families, the same land had to be shared among more people. In the smaller families, fewer people shared the same land. As a result, the value of each person's share began to differ.

That is, in a sense, what has happened to votes in India. In 1967, an MP across most major States represented roughly four to five lakh electors. Today, a MP from Kerala represents about 14 lakh electors, while in Uttar Pradesh and Bihar, the figure is around 19 lakh.

This variation is the result of a deliberate decision by all parties, taken on two occasions, in 1976 and 2001, not to punish States that had stabilised their populations. The Constitution gives that leeway. The size of Lok Sabha constituencies is not necessarily based on a national average, which today would be about 18 lakh voters per constituency. Article 81 requires seats to be allocated among States "so far as practicable", on the basis of a national average. This leeway for variation allows for a balance between two principles that can be in tension: federalism, or representation of States, and democracy, or one vote, one value.

And that is the central tension the debate on delimitation now needs to resolve.

What is gerrymandering?

When we discuss the democratic principle of One Person, One Vote, One Value, the first requirement is that every Lok Sabha constituency should have roughly the same number of voters. But equal numbers alone do not guarantee equal value for every vote. Why? Because even when constituencies contain the same number of voters, the way those voters are grouped can dramatically affect electoral outcomes.

Consider a simple example **(Image 2)**. Imagine there are 50 voters. Party A has 20 supporters and Party B has 30 supporters. There are five constituencies, each with 10 voters and electing one representative.

In the first scenario, voters are distributed fairly across the five constituencies. The result broadly reflects the overall vote share. Party A and Party B win seats broadly in proportion to their support. In the second scenario, Party A's voters are spread thinly across constituencies. This is called cracking. Although Party A has 40% of all voters, it may not have enough support to win even one constituency. Thus, 40% of voters could end up with no representation at all.

In the third scenario, Party B's voters are heavily concentrated in a few constituencies. This is known as packing. Party B wins those seats with huge margins but ends up wasting votes, allowing Party A to win more seats despite having fewer supporters overall.

The way constituency boundaries are drawn can profoundly shape democratic representation and electoral outcomes.

Extracted from the author's introduction to 'The Delimitation Debate: The Union and its Units,' published by The Hindu. Order the book here:

Image 1

India as a joint family

Think of India as one joint family and the States as its constituent family units. As populations change, value of vote can change too

EVERYONE STARTS WITH EQUAL VALUE | OVER TIME SIZE CHANGES | VALUE CHANGES WHEN POPULATION SIZE CHANGES

Image 2

A delimitation example — Party A, Party B

Source: Gerrymandering - Everything Policy - Briefs Spencer (2023)

Dark Grey: 2 Seats, Light Grey: 3 Seats | Dark Grey: 0 Seats, Light Grey: 5 Seats | Dark Grey: 3 Seats, Light Grey: 2 Seats

Comparison of Lok Sabha seat distribution based on 2024 electors and 2011 population

State/Union Territory	Current Seats (543)	Seats*	Seats**
A.P.	25	23	22
Arunachal Pradesh	2	0	1
Assam	14	14	14
Bihar	40	43	47
Goa	2	1	1
Gujarat	26	27	27
Haryana	10	11	11
H.P	4	3	3
Karnataka	28	30	27
Kerala	20	15	15
M.P	29	31	33
Maharashtra	48	52	50
Manipur	2	1	1
Meghalaya	2	1	1
Mizoram	1	0	0
Nagaland	1	1	1
Odisha	21	19	19
Punjab	13	12	12
Rajasthan	25	30	31
Sikkim	1	0	0
Tamil Nadu	39	35	32
Tripura	2	2	2
U.P.	80	86	90
WB	42	42	41
Chhattisgarh	11	11	11
Jharkhand	14	14	15
Uttarakhand	5	5	5
Telangana	17	18	16
Andaman & Nicobar Islands	1	0	0
Chandigarh	1	0	0
Dadra & NH and Daman & Diu	2	0	0
Delhi	7	8	8
Lakshadweep	1	0	0
Puducherry	1	1	1
J&K	5	5	6
Ladakh	1	0	0
Total	543	541	543

*If seats are redistributed as per the 2024 electoral roll

**Seats are redistributed as per the 2011 population

THE GIST

The 2027 Census is set to trigger a fresh delimitation of Lok Sabha constituencies under Articles 81 and 82, even without a new Constitutional amendment.

The exercise could significantly alter the distribution of Lok Sabha seats, with southern States likely to lose their share and Uttar Pradesh, Bihar and Rajasthan likely to gain.

Redrawing constituency boundaries could also affect electoral outcomes, as the grouping of voters through 'cracking' and 'packing' can influence which parties win seats.

Key Analytical Takeaways

- **Trigger & Constitutional Basis:** Under Articles 81 and 82, delimitation is automatically triggered upon publishing the first Census data after 2026 (i.e., the 2027 Census). A Constitutional Amendment is only required if existing provisions—such as changing the 550-seat cap or revising formulas—are altered.

- **Impact on Seat Allocation:** Reallocating Lok Sabha seats strictly on population lines will benefit northern Hindi-belt States (e.g., UP, Bihar, Rajasthan) due to higher fertility rates, while southern States (e.g., Kerala, Tamil Nadu) risk losing relative political weight despite successfully achieving population stabilization.
- **Timeline and Completion:** Since the 2027 Census will use digital data collection, execution may be faster than the 2002–2008 exercise. However, if incomplete before the 2029 general elections, it will carry over to the subsequent Lok Sabha term.
- **Women's Reservation Linkage:** Under the 106th Constitutional Amendment Act, 2023, the 33% reservation for women in the Lok Sabha and State Assemblies is operationalized only after the census and delimitation exercise are completed.
- **Electoral Outcomes & Boundary Manipulation:** Redrawing boundaries can alter results through mechanisms like cracking (thinning out opponent supporters) and packing (concentrating opponent voters into single districts to waste excess votes), impacting fair representation.

Related Static Dimensions (UPSC Polity)

- **Article 81:** Composition of the Lok Sabha and population-proportionate allocation.
- **Article 82:** Parliamentary mandate for readjustment of seats and territorial constituencies after every census.
- **Article 170:** Corresponding provision governing the delimitation of State Legislative Assemblies.
- **Constitutional Freeze (42nd & 84th Amendments):** The 42nd Amendment (1976) froze seat allocation based on the 1971 Census. The 84th Amendment (2001) extended this freeze until the first census post-2026 to incentivize population control.
- **Delimitation Commission:** A high-powered statutory body chaired by a retired Supreme Court judge. Its orders carry the force of law and cannot be challenged in any court under **Article 329(a)**.

Conclusion

Delimitation must carefully reconcile "One Person, One Vote, One Value" with the principles of cooperative federalism. Protecting southern States from political penalization for demographic efficiency remains vital to preserving regional balance and the nation's federal spirit.

UPSC Prelims Practice Questions

Question: Which of the following Constitutional provisions is primarily associated with the composition and territorial constituencies of State Legislative Assemblies?

A. Article 81

B. Article 82

C. Article 170

D. Article 324

Ans: C)

UPSC Mains Practice Questions

Question: "Delimitation is not merely an exercise in redrawing electoral boundaries; it can reshape India's federal political balance." Discuss.**(10 Marks, 150 Words)**

Page 11 : GS III : Indian Economy&Environment / Preliminary Examination

India’s energy transition has made significant strides in electric mobility, solar agriculture, and building efficiency. However, decarbonizing the industrial sector—which consumes vast amounts of thermal energy—presents the next critical frontier. Electrifying industrial heat, especially within Micro, Small, and Medium Enterprises (MSMEs), is essential for boosting manufacturing competitiveness, strengthening energy security, and achieving net-zero goals.

CACHE

A common blueprint for India's industrial heat electrification

India's next phase of energy transition must focus on electrifying industrial heat; a coordinated approach involving innovative financing, skilled workers, demonstration projects and cluster-level planning can help scale the transition and strengthen manufacturing competitiveness

Vrinda Gupta
Srinivas Ethiraj

India's energy transition is already mainstreaming renewable-powered electrification across major demand centres. Electric mobility is replacing internal combustion engines, agriculture is increasingly powered by solar irrigation, and buildings are adopting smarter appliances. The next phase lies in electrifying industrial heat, particularly across India's MSMEs, to strengthen manufacturing competitiveness, energy security and decarbonisation.

India's solar photovoltaic revolution reduced solar tariffs by more than 85% over the past decade through a coordinated ecosystem of supportive policies both at the national and state level, innovative financing, competitive vendors and markets, institutional mandates, and sustained private sector investment. Now, scaling industrial heat electrification will require a similar approach. The focus has shifted to how India plans and scales this transition.

No blanket solution

First, facility-level engineering assessments should become the foundation of industrial heat electrification. Most industries have limited visibility of their thermal systems beyond fuel consumption. Steam flow is rarely metered, process temperatures are often unmonitored, and waste heat streams remain unquantified. Without robust engineering assessments, industries risk investing in technologies unsuited to their process requirements. So, engineering assessments should evaluate legacy boiler performance and operating costs, optimise steam systems, identify recoverable waste heat, and where feasible, replace steam with more efficient direct heating before electrification.

Electricity can be used only where it delivers the greatest value. So, process integration tools such as pinch analysis should identify internal heat recovery opportunities before electrification.

Representative facilities can be used to develop standardised process profiles that estimate hourly thermal demand, identify electrifiable heat loads, and inform future electricity demand for utilities and grid operators. Aggregated across industrial clusters, these assessments can support district-level industrial decarbonisation plans tailored to local industrial profiles, renewable resources, and infrastructure readiness. Localised planning recognises that there is no one-size-fits-all solution.

Second, India should adopt a technology-inclusive approach. Industrial processes vary widely in temperature, production schedules, and thermal demand. So a single technology solution is impractical.

Heat pumps are well suited for low- and medium-temperature applications, particularly where waste heat can be recovered. Electric boilers currently offer a practical pathway for steam generation above 200° C. Mechanical vapour recompression systems can recover and reuse process vapour in evaporation-intensive processes. Thermal energy storage solutions can act as thermal buffers by storing surplus heat generated when renewable electricity is abundant or recovered from industrial waste heat, and releasing it when process heat is required, improving operational flexibility and reducing peak electricity demand.

Powering up: A successful electrification programme hinges on affordable and reliable renewable electricity supply. GETTY IMAGES

Access to capital

Third, a successful electrification programme hinges on affordable and reliable renewable electricity supply. While renewable generation costs have fallen dramatically over the past decade, the delivered cost of renewable electricity for industries remains influenced by network charges, open-access provisions, and other transaction costs.

As India's commercial and industrial renewable energy market matures, reforms should focus on reducing these costs by streamlining open-access procedures, rationalising banking provisions, reducing transactional complexity, and strengthening grid infrastructure, particularly for electrification projects that replace fossil fuel-based heating. Renewable electricity planning should be integrated with industrial electrification, enabling industries to align thermal demand with periods of renewable generation.

Fourth, financing models must evolve alongside technologies. The principal challenge in scaling industrial heat electrification extends beyond technology to reducing engineering and investment risks, particularly for MSMEs with limited access to capital and technical expertise.

Technology leasing, heat-as-a-service, energy service company models, and blended finance can lower the upfront investment and technology risks. Equally important is demand aggregation. Facility-level assessments should feed into cluster-level investment pipelines, allowing industries with similar thermal profiles to aggregate demand, reduce procurement costs, and improve access to low-cost finance.

The right fit

The following criteria can help identify brownfield units best suited for early deployment of low- and medium-temperature electrification technologies:

Screening criterion	Indicative threshold
Steam generation cost	> ₹2.8 per kg of steam
Steam-to-fuel ratio	< 3 kg steam per kg fuel
Recoverable waste heat	Temperature ≥ 50° C; flow rate ≥ 60 cubic metres per hour
Delivered cost of renewable electricity	< ₹6 per kWh
Boiler service life	> 18 years

Demonstration projects

Fifth, India needs skilled workers and implementation capacity tailored to cluster needs. Many industries, particularly MSMEs, face capability and skill gaps that slow technology adoption, reduce efficiency, and limit innovation. Most of the vocational and industry training programmes often focus on routine operations and maintenance. Industrial heat electrification will require an engineering transition at the shop floors rather than a simple equipment replacement exercise. Scaling it requires a workforce of engineers, technicians, and operators with capabilities in process integration, system design, installation, commissioning, operation, and maintenance, and digital automation and control systems.

Sixth, India needs demonstration projects before it needs large-scale mandates. India needs first-of-a-kind demonstration projects across representative sectors, process temperatures, and industrial clusters. This will generate engineering evidence, validate business models, and reduce investment uncertainty. The priority should be to identify the most suitable first-mover facilities.

Based on our analysis in brownfield settings, units that meet these screening criteria are the best candidates for early deployment of low- and medium-temperature (up to 250 °C) electrification technologies **(Table 1).**

Common blueprint

Finally, industrial heat electrification needs a coordinated national framework supported by place-based implementation. It should establish engineering standards, designate institutional responsibility, facilitate demand aggregation, mobilise finance, and support early demonstration projects. Its implementation should be driven through district and cluster-level industrial energy transition plans, allowing each industrial cluster to transition according to its unique thermal profile, local context, electricity market, and renewable energy potential.

India now needs a common blueprint to transform industrial heat electrification into a scalable industrial strategy. Industrial heat offers an opportunity to decarbonise manufacturing, reduce greenhouse gas emissions, and build a more resilient and future-ready industrial economy.

(Vrinda Gupta is associate director, Energy Transition, Vasudha Foundation. Srinivas Ethiraj is assistant manager, Energy Transition, Vasudha Foundation)

Key Pillars of the Blueprint

- **Facility-Level Engineering Assessments:** Rather than replacing equipment blindly, industries must conduct detailed thermal audits. Applying process integration techniques like pinch analysis ensures internal waste heat is recovered and steam systems are optimized before electrification occurs.

- **Technology-Inclusive Solutions:** Industrial heat requirements vary by temperature and process type. A mix of solutions is required:
    - Heat Pumps: Ideal for low-to-medium temperature needs and waste heat recovery.
    - Electric Boilers: Practical for high-temperature steam generation (> 200°C).
    - Mechanical Vapour Recompression (MVR): Effective for evaporation-heavy processes.
    - Thermal Energy Storage (TES): Acts as a thermal buffer, matching heat output with periods of abundant, cheap renewable power.
- **Power Sector Reforms & Open Access:** Delivered costs of renewable electricity remain high due to network charges and complex open-access regulations. Streamlining open access, rationalizing banking rules, and enhancing local grid capacity are vital for making power affordable.
- **Innovative Financing & Aggregation:** High upfront costs deter MSMEs. Business models like Heat-as-a-Service (HaaS), Energy Service Company (ESCO) structures, equipment leasing, and blended finance lower investment risk. Aggregating demand across industrial clusters reduces procurement costs.
- **Workforce Upskilling:** The transition requires shop-floor expertise beyond basic O&M. Engineers and technicians must be trained in digital automation, system integration, thermal design, and commissioning.
- **Demonstration Projects First:** Before enforcing mandatory regulations, first-of-a-kind (FOAK) pilot projects across representative MSME clusters are needed to build empirical evidence, refine business models, and boost investor confidence.

Static Dimensions & Policy Mapping (UPSC)

- **National Mission for Enhanced Energy Efficiency (NMEEE):** Key initiative under the National Action Plan on Climate Change (NAPCC), laying the groundwork for industrial decarbonization.
- **PAT (Perform, Achieve and Trade) Scheme:** A regulatory mechanism under the Bureau of Energy Efficiency (BEE) that sets energy consumption reduction targets for energy-intensive "Designated Consumers."
- **MSME Ecosystem:** MSMEs contribute roughly 30% to India's GDP and are clustered geographically (e.g., textile, foundry, ceramic hubs), making cluster-level planning highly viable.
- **Pinch Analysis & Process Integration:** A chemical engineering methodology used to optimize thermal energy recovery by calculating thermodynamically feasible heat transfer networks.
- **Open Access & Banking Rules:** Governed under the Electricity Act, 2003, and the Green Energy Open Access Rules, 2022, enabling large consumers to buy green power directly from generators.

Conclusion

Electrifying industrial heat is not a simple equipment swap; it requires a coordinated, cluster-level strategy. By coupling innovative financing and targeted upskilling with supportive open-access power policies, India can establish a scalable model for industrial decarbonization while protecting MSME competitiveness.

UPSC Prelims Exam Study Questions

Question: Pinch analysis, sometimes used in industrial energy management, is primarily associated with:

A. Optimizing recovery and integration of thermal energy within industrial processes.

B. Measuring the carbon content of coal.

C. Determining the geological age of minerals.

D. Forecasting electricity demand at the national level.

Ans:A)

UPSC Mains Exam Study Questions

Question:"The next frontier of India's energy transition lies not merely in electrifying mobility but in electrifying industrial heat." Discuss the technological and policy challenges involved.**(10 Marks, 150 Words)**

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The Indian paints and coatings sector—a ₹1 lakh crore market dominated by decorative paints—is witnessing heightened competition with major new entrants challenging established market leaders. Emerging regional players like Indicus Paints (under VNC Group) are deploying hyper-local cultural narratives, digital content, and architectural engagement to build early brand recall and achieve differentiation in a highly crowded, intermediary-driven industry.

Using cultural connect and advertising to build consumer awareness and brand differentiation

Shakthi H

Doing up a room calls for way more than just picking the paint colour for the walls. Long before choosing a brand, homeowners think about how they would use the space – a distraction-free work den, a fun-themed child's bedroom or a cosy balcony? They look for inspiration and lifestyle ideas first. To meet these consumers early in their shopping journey, Indicus Paints creates themed content on Pinterest centred around spaces such as home-offices, staircases, and balconies.

The Pinterest presence has generated engagement for the relatively new brand, says Gokul Basker, founder of Indicus Paints and partner at VNC Group, a diversified manufacturing and distribution conglomerate based in Tamil Nadu. Around half a million consumers engage with the content each month, while total views have run into 4-5 million, along with saves and shares, since the company launched in 2021. He does not, however, draw a direct connection between the engagement and sales. The platform, he says, gives people space to explore options at an early stage, before finally choosing a paint brand. This distinction matters in a category where the person buying the paint is not always the one deciding on the brand.

Depending on the segment, homeowners may turn to painters, contractors, civil engineers, architects, or dealers for advice and recommendations. The consumer may have a veto but it is rarely exercised, Mr. Basker says.

For Indicus Paints, the VNC Group's first consumer brand, awareness forms an important first step in a category that is getting crowded with the entry of many new players with big pockets (like Birla Opus). The Indian paints and coatings market is estimated at ₹1 lakh crore, with a CAGR of 9% driven by rapid urbanisation, real estate activity and rising personal income. Decorative paints command 75% of this market and Asian Paints is the clear leader.

Grabbing attention

Indicus, says Mr. Basker, is in the awareness creation phase, ensuring the name is not unfamiliar to a consumer when a contractor recommends it. He observes younger consumers taking a greater interest in paint selection today, researching colours and finishes, and arriving for the purchase armed with more information than earlier generations. Instagram and other social media have made consumers more discerning, he says.

Drishti Bommai: Reviving The Tradition, a documentary on figurines seen on South Indian rooftops, is one of Crosssections' project.

Advertising is one of the ways in which the brand is building initial awareness. Mr. Basker says the mass-market communication uses humour and entertainment to establish Indicus as a new and bold brand. Longer-term initiatives such as serving as the co-title sponsor of the reality TV show *Super Singer Junior 11* help in sustaining brand recall in a category where the consumer may repaint a home only once in several years.

Then there are the targeted efforts, such as Crosssections – a microsite within the brand's website that's focused on architects and people interested in art and culture.

Visual symbolism

One of the projects under Crosssections is *Drishti Bommai: Reviving The Tradition*, a documentary on the striking charm figurines seen across South India on rooftops, at the entrances of new buildings, and on vehicles. The film looks at the cultural beliefs surrounding the figures, the visual symbolism of their distinctive features and the traditional craftsmanship involved in their making. It also captures the difficulties faced by the artisans, as cheaper, machine-made products and changing urban aesthetics affect the market for traditional crafts. Cross sections helped draw the attention of architects to the relatively unknown paint brand, says Mr. Basker. After seeing the content on the microsite, architects, especially the younger crowd, reached out to Indicus for colour decks and meetings, Mr. Basker says.

The brand's advertising and cultural communication have prompted consumers to enquire about its availability in different parts of the country. Dealers have also received requests for specific products such as Ceiling Bright, the white water-based acrylic emulsion for ceilings, which is largely not available from other brands. Mr. Basker distinguishes between consumer-facing communication and those curated for channel partners. "You can't replace painter and dealer programmes with influencer marketing. Brands need to balance both," he says.

Xavier Prabhu, founder of BusinessHubs Consulting, an independent brand consultant, sees paint as a category where intermediaries such as dealers, contractors and interior designers continue to influence purchase decisions.

At the same time, he notes that consumers today are more informed, with creators and digital content helping them understand products, applications and finishes.

Cultural positioning

Mr. Prabhu sees Indicus' cultural positioning as a way of creating a distinctive signal for the brand. Its focus on Tamil Nadu and its cultural heritage helps differentiate it from larger national and global brands that typically approach India as a single market .

If Indicus expands beyond its regional focus, it may need to identify cultural signals that resonate in other markets as well, Mr. Prabhu says.

For now, its brand-building effort is on two fronts: creating broad awareness through advertising and maintaining visibility in a category where purchases are infrequent; and targeted initiatives such as Pinterest and Crosssections to engage audiences on subjects that extend beyond paint.

In a category where the buying decision can pass through several hands, the brand-building challenge is not simply about reaching the consumer but also being recognised when the conversation around paint does happen.

(The writer is with The Hindu businessline)

Key Analytical Takeaways

- **Early-Stage Consumer Engagement:** Homeowners plan room utility long before choosing a paint brand. Brands capture top-of-funnel consumer interest early in the buying journey through visual, theme-based digital content (e.g., Pinterest posts on home offices and balconies).
- **Overcoming Intermediary Dominance:** Despite consumers becoming more informed through digital platforms, intermediaries—painters, contractors, dealers, and architects—continue to heavily influence buying decisions. Successful brand strategies must balance consumer-facing marketing with channel-partner outreach.
- **Cultural Heritage as a Differentiator:** Regional brands build distinct identities by aligning with local heritage. Projects like Crosssections (including the documentary Drishti Bommai: Reviving The Tradition) engage architects and cultural enthusiasts while raising awareness for endangered traditional crafts.
- **Targeted Niche Solutions:** Developing specialized products (such as white acrylic emulsions for ceilings) drives direct consumer pull, compelling dealers to stock new regional brands even in incumbent-dominated markets.

Related Static Dimensions

- **Art & Culture - Intangible Heritage:** Corporate patronage and digital documentation of regional folk arts (e.g., South Indian Drishti Bommai figurines) aid in preserving traditional craftsmanship and supporting artisan livelihoods amid urban aesthetics shifts.
- **Economy - Industrial Strategy & Marketing:** The dynamics of regional industrial conglomerates scaling consumer-facing brands to compete with oligopolistic national incumbents.
- **Consumer Behavior & Digital Economy:** Shift in consumer decision-making pathways driven by social media research, altering traditional supply-chain influence structures.

Conclusion

Building brand differentiation in mature markets requires moving beyond traditional mass advertising. Combining hyper-local cultural connect with direct architect and channel engagement offers a sustainable strategy for regional players to build recall, support local heritage, and challenge established market leaders.

UPSC Mains Practice Questions

Question: Digitalisation and cultural localisation are creating new opportunities for regional enterprises to challenge established brands. Discuss their potential to promote competition, innovation and inclusive industrial growth in India.**(10 Marks, 150 Words)**

A new security triangle emerges with the Makkah Pact

Mahesh Sachdev

Retired Indian Ambassador, specialising in the Arab world and oil issues

The Makkah Joint Defence Agreement (MJDA), signed on August 7, 2026, by the top leaders of Saudi Arabia, Türkiye and Pakistan, is the first regional realignment since the geostrategic tsunami of the United States-Iran war. While the MJDA text has not been revealed, the joint statement issued specifically states that "any armed attack against any one of the three states shall be regarded as an attack against them all".

This echoes infamous Article 5 of the North Atlantic Treaty Organization (NATO) — never invoked — leading speculators to claim that the MJDA was a harbinger of a "Muslim NATO". It appears to be part of a jerky Saudi response to specific security challenges, including a Strategic Mutual Defence Agreement (SMDA) with Pakistan last year and a 14-country Multinational Maritime Defence Alliance (MMDA) in the last week of July.

Shifting alignments, uncertain stakes

Any analysis of the MJDA faces multiple uncertainties, including ongoing regional turbulence, partners' previous karma, and their varied expectations. This hazy context creates a push-pull effect: from anticipation of the MJDA having profound cascading implications to it being a seemingly desultory, inconsequential response to their asymmetric defence and security challenges. Some also see it as inducing counter-polarisation and alarming other stakeholders from Iran and its non-state allies, Israel, Kurds, and Greece to the United Arab Emirates and India. To walk back, the Saudi Deputy Foreign Minister has clarified that it is neither an effort to establish a military axis nor a sectarian bloc. He denied any link to nuclear ambitions or an arms race.

This denial is unlikely to pierce the statement's conspicuous silence about the precise threats that the MJDA is geared to confront, the U.S.-Iran war roiling the region, Israeli aggressiveness, threats from the non-state actors, and the impact of choke point constrictions. It also refrains from either inviting like-minded regional powers to join in or an uplink with the existing collective security architectures provided by the Arab League, the Organisation of Islamic Cooperation and the Gulf Cooperation Council (GCC).

Observers point out that the Arab-Muslim world has remained divided against Israel for close to eight decades. Hence, the prospect of the MJDA being a precursor to a Muslim NATO polarised against Iran and its Arab proxies appears far-fetched at this stage. Moreover, even as all three MJDA signatories are allies of the U.S. (which remains suspiciously silent), it is unclear if it is meant to substitute the regional Pax Americana or to serve as a surrogate for the *ancien régime*. In the same vein, if the proposed Muslim NATO in future decides to confront Israel, the U.S. would have scored its own goal.

Moreover, the MJDA is beset by various snags. The Saudis have bitter memories of the Ottoman rule, which brutally suppressed the Al-Saud. For similar reasons, from Türkiye, Ankara's boots on the ground have been shunned by most post-independence Arab regimes.

Till recently, Türkiye promoted the Sunni outfits such as the Muslim Brotherhood, Hamas and motley Syrian militias, many of which are anathema to the Gulf regimes. Türkiye's President Recep Tayyip Erdoğan's Neo-Ottoman ambitions to lead the Sunni Islamic world collide with the Kingdom's self-image of being the Custodian of Islam's Two Holiest Shrines. Riyadh does not contenence playing second fiddle to Turkey or any other Muslim power. President Erdoğan had a testy relationship with Saudi Crown Prince Mohammed bin Salman (MbS) over the 2018 murder of Jamal Khashoggi, a U.S.-based Saudi journalist, in the Saudi consulate in Istanbul. Turkish leaks on this episode sullied MbS's image, making him a western outlier.

On the other hand, Pakistani troop deployments in Saudi Arabia in the past resulted in frictions due to chain of command disputes, Islamabad's refusal to have its troops shorn of Shias and its reluctance to confront Iran or Yemen. Armed forces in Türkiye and Pakistan have a long-standing tradition of Bonapartism. Saudis have kept armed forces and the National Guard, both with an American-styled set up, out of politics since the Ikhwan militia insurrection (the late 1920s) and the Makkah siege of 1979. Both Türkiye and Pakistan have an active border with Iran — offering a potentially lucrative post-war economic bonanza that they would be loath to forego. Pakistan's enthusiasm for the MJDA is circumscribed by its 900 kilometre-long border with Iran, a large Shia minority, internal security challenges and hostility with India and Afghanistan. In a typical doublespeak, last week, Pakistan began formal discussions on a Free Trade Agreement with Iran, notwithstanding the U.S. sanctions, the MJDA and the SMDA.

Riyadh's security needs

The MJDA is clearly fulcrumed around Saudi security requirements, which Riyadh expects Türkiye and Pakistan to mitigate as part of a "friends with benefits" arrangement. However, the current threats faced by Saudi Arabia are complex and asymmetric, ranging from air attacks on its vital and vulnerable oil and civil infrastructure by Iran and its proxies, the closures of the Strait of Hormuz and Bab al-Mandeb and the possible insurrection by the restive Shia minority. It is unclear if Türkiye and Pakistan can meet such challenges, where the U.S. Central Command, with its large, long-standing presence and state-of-the-art equipment, failed. The new allies could perhaps upstage the U.S. in having more boots on the ground in Saudi Arabia, but the Kingdom is unlikely to face a ground invasion. Moreover, relying on foreign forces to address internal security challenges would be bad optics for the Kingdom. The foregoing is not to deride the MJDA as merely a cosmetic exercise. It symbolises the congruence of the three large Sunni powers with considerable complementarity: the Saudi \$83 billion defence budget, Türkiye's booming military industrial complex exporting \$10 billion annually and Pakistan's 6,60,000-strong armed forces. Their defence and security cross-pollination through military exercises, interoperability of weapon systems and co-production and development of hardware would be beneficial to them all. Additionally, Türkiye and Pakistan could gain political influence in the Kingdom and enrich themselves.

At this stage, the MJDA's future appears uncertain. It may flourish if a low-burn attrition war continues to ripple through the region. Ironically, if an all-out shooting war breaks out, Türkiye and Pakistan may be hesitant to commit forces against Iran, their neighbour. At the other end, if peace prevails, the MJDA would become superfluous. A market share scrimmage among the oil exporters would create a glut, affecting the Saudi capacity to bankroll the MJDA partners.

Having suffered Iranian doggedness and Trumpian tantrums, Saudi Arabia and other Gulf Arabs are currently experimenting with various security alternatives. The Saudis began the SMDA with Pakistan last year and have felt the need for an MMDA and MJDA. They do not appear to be playing a zero-sum game between semi-reliable Pakistan and India. U.S. President Donald Trump's unreliability was on full display to the Saudis recently in his last-minute Abraham Accords rider to the recent nuclear agreement with the Kingdom. The Saudis may not wish to further complicate their dependence on Uncle Sam by deepening their entanglement with Ankara and Islamabad, both ultimately subject to Washington's dictates.

The implications for India

Depending on various scenarios panning out, the MJDA can impact India's interests in multiple ways. While India needs to keep a steely eye on Pakistan's attempt to align the MJDA partners with it against India, New Delhi should not overreact. As the world's third-largest crude oil importer, India is slated to drive global demand for the next 15 years. India has been the Kingdom's third-largest market and second largest trading partner. Like Saudi Arabia, India has been both a consistent and moderate pro-status quo power amenable to simpler paradigms of economic complementarity.

Riyadh finds ties with India uncluttered by extraneous considerations. India is a geo-strategically safe bet for the turbulent Gulf. Riyadh, facing a huge paradigm shift, is most unlikely to wade into supporting Pakistan's adventurism against India. So, while the MJDA may give Islamabad an adrenaline high, Pakistan's quest to match India's rise through military fluster in West Asia is unlikely to succeed.

> Depending on how different scenarios unfold, the Makkah Joint Defence Agreement (MJDA) could affect India's interests in several ways

GS Paper II: International Relations

UPSC Mains Exam Practice Questions: Critically examine the implications of Saudi Arabia's deepening defence cooperation with Pakistan and Türkiye for India's strategic interests in West Asia.(**10Marks, 150 Words)**

Context : The signing of the **Makkah Joint Defence Agreement (MJDA)** on August 7, 2026, by **Saudi Arabia, Türkiye, and Pakistan** introduces a significant collective defense mechanism in West Asia. Containing a mutual defense clause—where an attack on one is considered an attack on all—it evokes comparisons to NATO's Article 5. Formed in the backdrop of the US-Iran conflict and broader regional insecurity, the pact highlights shifting alliances in the Middle East while raising strategic questions for regional and global stakeholders, particularly India.

Key Pillars of the Analysis

1. The Dynamic & Context of the Pact

- **The "Article 5" Principle:** The clause treating an attack on one as an attack on all has led observers to frame the MJDA as a potential **"Muslim NATO"**.

- **Preceding Security Measures:** The MJDA builds on prior Saudi defense measures, including the 2025 **Strategic Mutual Defence Agreement (SMDA)** with Pakistan and the **Multinational Maritime Defence Alliance (MMDA)**.

- **Official Clarifications:** Saudi leadership has stated that the pact is neither a military axis nor a sectarian bloc, denying links to nuclear ambitions.

2. Strategic Uncertainties & Structural Divergences

- **Unclear Security Mandate:** The joint statement lacks specifics regarding threats, whether from state actors, asymmetric warfare, or choke-point vulnerabilities like the Strait of Hormuz.

- **Historical Friction:** Türkiye's Ottoman past and support for groups like the Muslim Brotherhood create lingering friction with Gulf monarchies. Additionally, rivalry between Erdogan's regional ambitions and Saudi Arabia's leadership role remains a underlying factor.

- **Limitations of Partners:**

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- **Pakistan:** Faces domestic political instability, economic stress, a non-sectarian requirement for deployed forces, and shares a 900-km border with Iran that complicates military commitments.
- **Türkiye & Pakistan:** Both maintain diplomatic and economic interests with Tehran, limiting their willingness to engage directly against Iran.

3. Complementarities vs. Limits of the Tripartite

- **Synergies:**
  - **Saudi Arabia:** Financial power ($83 billion defense budget).
  - **Türkiye:**Defence manufacturing capability ($10 billion annual exports).
  - **Pakistan:** Large military personnel footprint (~660,000 active troops).
- **Security Gaps:** These partners offer ground forces and hardware, but they may not fully replace the advanced air defense, intelligence, and naval capabilities provided by the US Central Command against complex asymmetric threats.

4. Strategic Implications for India

- **No Immediate Threat to Indo-Saudi Relations:** Saudi-India relations remain grounded in trade, energy security, and anti-terrorism cooperation.
- **Geoeconomic Fundamentals:** India is the world's third-largest crude oil importer and a key trade partner for Saudi Arabia.
- **Limits of Pakistan's Influence:** While Pakistan may seek to leverage the alliance to balance India, Riyadh is unlikely to compromise its economic and strategic ties with New Delhi.

Related Static Dimensions

- **International Relations:**
  - Bilateral, Regional, and Global Groupings involving India: Impact of West Asian politics on India's 'Link West' policy.
  - Effect of Policies & Politics of Developed & Developing Countries: Strategic autonomy, US security presence in the Persian Gulf, and energy pipeline security.
- **Security:**
  - Maritime security at global maritime choke points (Strait of Hormuz, Bab-el-Mandeb).

Strategic Way Forward for India

1. **Maintain Strategic Autonomy:** Engage with Gulf nations, Iran, and Israel independently without taking sides in regional pacts.

2. **Deepen Economic Co-dependence:** Expand ties with Saudi Arabia beyond crude oil into renewables, technology, and infrastructure.

3. **Enhance Maritime Awareness:** Strengthen presence in the Western Indian Ocean via bilateral naval exercises and initiatives like the Information Fusion Centre (IFC-IOR).

Conclusion

The Makkah Joint Defence Agreement represents a realignment driven by regional security pressures and shifting US policy. However, historical mistrust, conflicting strategic interests with Iran, and functional security limitations may hamper its development into a formal "Muslim NATO". For India, a balanced diplomatic posture, supported by strong economic and energy ties with Gulf nations, ensures that its core strategic interests in West Asia remain protected.

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