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MESSAGE

Msgr. Sebastian Vethanath
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It is with immense pleasure that this *Handbook on Current Affairs* is being presented before the academic community in Kerala. The book aims at promoting the career competencies of students in schools and colleges and I believe that it will help students and teachers to update their knowledge in various subjects. May God Almighty bless you abundantly.

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978-81-985405-3-9

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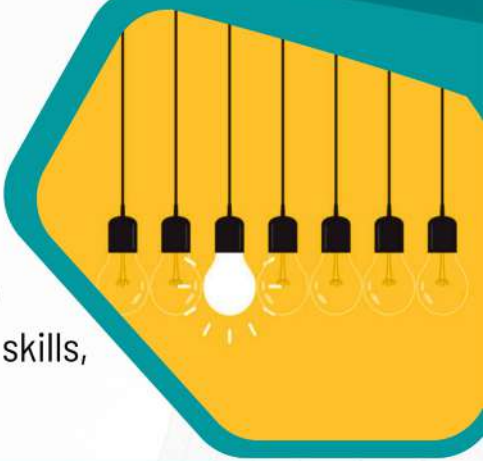

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Foreword

I am pleased to present before you the third book of the *Handbook on Current Affairs*. This book aims to bridge the gap between university curricula and the latest developments across various subjects so as to enhance the students' career competencies. It provides valuable insights into the key topics relevant for competitive exams, job interviews, and campus placements.

In today's education system, where curriculum updates often lag behind, students may lack exposure to current global events. While many publications cover specific topics, a comprehensive guide to the latest developments in areas like Economics, Science, Technology, Culture, Polity, International Relations, History, Environment, and Education is rare. This handbook, prepared by the Civil Service Institute Pala, seeks to fill that gap and supplement the students' knowledge in these critical areas.

The book is designed for final-year UG and PG students in Kerala who are preparing for job interviews, campus placements, or competitive exams such as civil services. It serves as a book for quick reference, complementing their academic learning. I hope it will be a valuable addition to the reference shelves of college/school libraries, like the previous editions and that it will be well-received by the academic community.

I extend my thanks to Msgr. Sebastian Vethanath (Institute Manager), Dr. Mathew Joseph (Associate Principal), the contributing experts, and the Editorial Board for their dedicated efforts in bringing out this book.

Dr. V. V. Georgekutty
Principal & Chief Editor
(Former Controller of Examinations, University of Calicut)

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Role of the United Nations in the 21st Century?

P. C. Cyriac IAS
Former Chief Secretary, Tamil Nadu

1. In the long history of mankind, there were many wars, where the stronger countries vanquished the weaker ones. All these wars caused a lot of death and destruction. But they were all local wars, confined to a region. But the 20th century had the misfortune of witnessing two World Wars in which deaths and destruction crossed all previous records. And there were theatres of war in every Continent and in all the Oceans.

2. The First World War (1914- 18) was described as "the war to end all wars"! After the First World War, they set up a League of Nations, to provide a Forum where all the Nations of the World would be members and where every dispute between Nations could be discussed and peaceful solutions arrived at. Unfortunately, this experiment did not succeed and a Second World War broke out, spelling untold suffering and killing hundreds of thousands of innocent people. (1939 to 45). This war ended with the use of Atom bombs, over Hiroshima and Nagasaki, which burst over these Cities in a noiseless flash, wiping out lakhs of people instantaneously.

3. After this most disastrous World War, where both the victors and the vanquished suffered severe losses, the four major powers who led the winning Allies, viz, USA, Britain, France and USSR, got together and resolved to form a stronger international body and drew up its Charter. And thus, was born the United Nations Organisation, (UNO), described as the only hope for a peaceful future for mankind.

4. The UNO had six main organs, the General Assembly, the Security Council, the Economic and Social Council, Trusteeship Council, International Court of Justice and the Secretariat. The UNO has many other Agencies under it, entrusted with specific responsibilities, like the UN Educational Scientific and Cultural Organisation, the World Health organization, International Labour organization, the Food and Agricultural organization, the World Bank, the International Monitory

Fund (IMF), etc. It is clear from this elaborate structure and the specialized agencies, that the UNO was determined to fight against not only political disputes and wars but the social evils like hunger, disease, poverty, and illiteracy.

5. But, when we look back after 75 years, has the UNO achieved its goals?

Many local wars had erupted right from the 1950's, like the Korean War, the series of wars in West Asia between Israel and the Arabs, including the latest war between Israel and the Hamas in Gaza and the still raging Four-year-old war between Russia and Ukraine. Though the UN Peacekeeping Force had played effective roles in many cases, the UNO was helpless when the direct interest of big powers was involved, as the five big powers (USA, Britain, France Russia and China used their power to veto any Resolution proposing effective intervention.

6. All the other agencies like UNESCO, WHO, FAO, World Bank and IMF have helped many countries in their hour of need. It may be noted that hundreds of projects in India, have received financial and technical support from these UN agencies like the World Bank, WHO and UNESCO. In 1991, when our Country found itself in a foreign exchange crisis, we were helped by the. IMF financially as well as by pressurising our government to liberalise our economy, which resulted in a vigorous growth spurt. In short, now, though the UNO was not crowned with success in all its ventures, it has played a very useful role.

7. So, let us discuss how the UNO can become more effective during the remaining 75 years of the 21st century! The first thing to be done is to restructure the Security Council to reflect the current realities in the World. Big Countries and Economies like India, Indonesia, South Africa and Brazil should certainly be given permanent seats in the Security Council. We have been trying to canvass support for our entry into the Security Council. Though America has expressed its no objection to India's entry into the Security Council, it has yet to extend its wholehearted support for us. And surprisingly, China is strongly objecting to the entry of India to the Security Council ss a permanent member. The ungrateful China has chosen to forget that it was India's voice that was the strongest in support of China, when that country was pressing its claim to replace the Nationalist Chinese

Government (Taiwan) as the permanent member of the UN Security Council. Let us hope that wiser counsels will prevail and that the vast majority of member countries will appreciate the urgency to make the membership of the UN Security Council reflect the current geopolitical reality, for its effective functioning.

8. Another question is whether the veto power enjoyed by the five permanent members, USA, Britain, France, Russia and the Peoples Republic of China, be continued? While the abolition of the right to veto will enable the Security Council to take appropriate decisions on merits in every case, Russia and China, who have used the veto in many occasions on selfish considerations, are sure to oppose any such move. In these circumstances, it appears that the Security Council will have to move ahead, with this impediment of veto, in the foreseeable future. AaWhile the peace keeping activities may continue to suffer, on this count, the UNO should use its various organs and Agencies to face the challenges in other areas and help create a better World.

9. Action has to be taken to create a future worth living. What should be the priorities for such a future?

   Improved access to basic services like health care, safe water and sanitation.

   Greater respect for human rights.

   Need to settle big and small conflicts in every Society speedily.

   Tackling poverty.

   Reducing Corruption and ushering in transparent processes in governance.

10. To discuss and understand the challenges and formulate proposals to effectively solve the above problems, the UN Secretary General, Antonio Guterrez, had convened a Seminar in September, 2024. The following points emerged as the major challenges at the Seminar—

    To remove the threat of a devastating nuclear war. For this the countries in possession of a nuclear arsenal should commit to a time bound elimination of nuclear weapons.

    A commitment should be got from the member nations for an international frame work for explorations in Outer Space, and to

ensure that all countries can benefit from the safe and sustainable exploration of Outer Space.

A commitment to prevent the misuse of new technologies like the lethal autonomous weapons, i.e., deadly weapons which can search for and locate certain pre- decided targets and attack them based on a program.

A commitment to controlling, preventing and combating trans - national organised crimes, including cybercrimes.

11. After further discussions, the United Nations has adopted a Pact for the future. This Pact is a strong statement of commitment by the member countries, to the UN Charter and it will open the door to new opportunities and possibilities, not yet tapped. This most detailed agreement ever, at the United Nations will ensure that the World Bank, IMF, G 20 and other key players will work together to reform the internal financial architecture in the member nations, bringing in better accountability and transparency. All this will help the member Nations to measure human progress not by the GDP alone, but by other indices reflecting distributive justice, as well. A global minimum level of taxation for the richest people in every Country, is another point. The Agreement covers the gradual reduction of use of fossil fuels, with a view to achieving net zero emissions by 2050, thus controlling global warming. The Pact provides for connecting all the schools, hospitals and the entire people to the Internet, taking care to make the online space safe for all, including children.

12. If all these provisions in the Pact get implemented in the member countries of the UN, the governance levels at the local and regional governments, civil society and even the private sector will be transformed to a high level. And the problems like the climate crisis, collapse of bio diversity, human right violations, will all get resolved.

13. Let us hope that the member nations will cooperate with the UNO during the coming decades and implement sincerely the commitments made by them in the Pact. In fact, it is the responsibility of the people in the member nations to put pressure on their leaders to translate the commitments made to the UN in to reality and convert the possible “breakdown “ of the systems into a ‘break through’ situation!

Donald Trump 2.0 for India: Too Early to Tell

T. P. Sreenivasan IFS
Former Ambassador of India

The second coming of Donald Trump as President has no precedent in history, not only of the United States, but of any country in the world. His transformation from a successful business leader to the Republican candidate for President was nothing short of a miracle. His chance of victory against Hillary Clinton was considered just about 1 percent, when he was nominated. But he won the election and proceeded to become the most controversial US President.

During his first term, he reversed the policies of many of his predecessors; with the slogan "America First," he declared the United Nations redundant, disowned the Iran Nuclear Agreement, walked out of the Paris Agreement and more. Paris Agreement, it was clear, would not bring the increase in global temperature to below 1.5 degrees Celsius, the Iran Agreement would halt Iranian nuclear activities only for only 15 years and disarmament agreements would not reach Global Zero! Not much damage was done to the world. President Biden kept his own pace to run his country and the world as though nothing had happened.

The most disgraceful behavior during Trump 1.0 was his rejection of the election results and a call for an insurrection. When he left Washington, it appeared like a final farewell to Presidency and to national politics. It was more than a miracle this time that he won with absolute majority and turned both the Houses over to the Republicans. In the four years out of office, he became more aggressive, more nationalistic, more defiant and more unpredictable and more irrational, but became a symbol of American hope, affirming that he will make America Great Again.

Trump's Inaugural speech had no call for unity of the country or for international cooperation. It was Trump all the way and his plans for deportation of illegal migrants, annexation of Greenland and Canada and taking over the Panama Canal were bizarre. The unkindest cut of all was the legal abolition of transgenders. He withdrew from WHO, the most crucial UN Agency at this time to make it breathe its last. He dictated peace to Israel, Hamas, Putin and Zelensky, without any viable alternative to war. Not even his closest allies were assured of any future and they were included in his list of countries against which he threatened to wage tariff wars.

In these circumstances, it is not only hazardous, but also futile to make any prediction whether Trump will be good for India. Unpredictability is the only attribute we can assign to him and the whole world has to wait with bated breath for the next set of Executive Orders which will turn the world topsy turvy again. Since he cannot change anything by himself, he has Elon Musk as his partner in arms.

India can be assured of only one thing. Trump needs India to contain China and as a member of the Quad, India will be counted as an ally in his confrontation with China. It was in this context that the new Secretary of State characterized India as an ally after a meeting with EAM Jaishankar a day after the inauguration of Trump as President. But India's reluctance to see the Quad as a military alliance may cause some irritation. A visit of PM Modi to Washington very soon is an early indication of a Trump-Modi equation on China. But he has made it clear that in the matter of immigration and trade matters, India may be as much an adversary as China. India has been informed that a large number of Indians will be deported and India has accepted that India would consider accepting them if they were found to be citizens of India. One can imagine long legal wrangles over their status and the circumstances in which they reached the US and how they acquired citizenship. The renowned bromance between Trump and Modi is likely to be put to a severe test as more announcements are made of diverse aspects of India-US relations. Whether Trump would accept India as an all-weather friend is yet to be seen.

Donald Trump's priorities will be himself, his family, his friends and his country. If India is helpful to him in any way in these pursuits, he will not come in the way of developing a strategic relationship with India. But India's intertest in reform of the United Nations and multilateralism in general will not find favour with him. As for our neighborhood issues, he may take a benign view as he shares our perspectives on China, Pakistan and Bangladesh. His decision to suspend economic assistance to Bangladesh may have been aimed at removing the suspicion that the US was behind the ouster of Sheikh Hasina.

President Donald Trump's initial intention seems to be to create "shock and awe" in the world to such an extent that his most drastic decisions in the future will appear benign. The fast-growing technology may disrupt the Master Disrupter any moment. India has reason not to be perturbed by the advent of Trump 2.0. But only time will tell his impact on India. We can wait to see, like the rest of the world, what the endgame will be. Que sera sera! Mao said the same about the French Revolution: "It is too early to tell."

Role of Buddhism in Indian Diplomacy & International Relations

Dr. K.P. NandaKumar
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Any discussion on post 2014 Indian diplomacy after Shri Narendra Modi came to power should take into consideration what Joseph Nye, prominent American political scientist and former Dean of the John F Kennedy School of Government at Harvard University, known for his work on international relations, global governance and 'soft power' has to say about the changing scenario in international diplomacy. The term 'soft power' has gained wide acceptability in all foreign policy discussions a cross the world. Mankind is more aware ofthe fact for peaceful global interaction. According to Nye, gone are the days of the pre-and immediate post WW II postures of the super powers donning for themselves the mantle of super-cops dictating terms to developing and under developed nations using their muscle power. Military power will and should no longer be the sole factor in determining the degree to which a nation commanded power in the international system.

Right from the days of Nehru to Modi, India has never believed that military power is the criterion for supremacy in the sub-continent. It was Nehru who formulated the famous *Panchasheel* Principles, exhorting the ideals of peaceful co-existence. Nehru's ideas that advocate non-coercive power projection continue to be the touchstone of India's foreign policy stance. It is in this connection that an appraisal and evaluation of Modi's foreign policythroughthe kaleidoscope of Buddhism gains currency. Buddhism in particular lends itself to soft power projection and of all nations in the world, India is probably the best nation to exploit this sentiment. This is more important at a time when the debate as to the potency of 'soft power'is valid or not.Our ancient civilization gave birth to a number of major religious faiths and beliefs that crossed the borders and permeatedfar and wide. At the same time India,that is Bharath, did not shut its windows to them but assimilated several cultures to enrich its social fabric. Sciences, spirituality, art and faith that developed over centuries in the sub-continent found their way to other regions, earning India a considerable amount of soft power leverage long before Nye coined the term in 1990.The present BJP government adopted the *Panchamrith* Principles to guide its foreign policy isactively promoted India's image as a rising global power. In doing so, the Government was only expressing a desire to lever-

age India's rich cultural links with other countries as part of its non- coercive soft power strategy, developed over the years. But it should not be forgotten that India's soft power strategy involved, not merely cricket and Bollywood, but also religious and cultural associations, thereby creating a mutually erected platform upon which further relations can bebased. Viewed from this angle, Buddhism possesses the greatest potential for soft power usage.

Buddhism was revived in the wake of the Second World War. The revival of this peace-loving religion gave a decidedly international outlook to it, and focused on transgressing the current sectarian and geographical boundaries. This was possible through a series of international meetings coupled with the constitution of organizationsaimed at transnational co-operation amongst various sects of Buddhism. Coming to the Asian continent, we found Japan and South Korea embracing their Buddhist heritage as they recovered from the aftermath of the devastating World War. Bhutan, Myanmar, Thailand and Sri Lanka conceived Buddhism as intrinsic to their national values and identity. Coming to our own country, we find the Modi Government incorporating Buddhist heritage in order to further diplomatic, economic, cultural andstrategic associations within the ambit of its foreign policy. The established transnational network for Buddhism, and the important role played by Buddhism in the lives of millions across the world, are what allows it to possess positive potential for Indian foreign policy. The pan Asian presence of the religion and its importance for natural identities in the region, coupled with its image of a peace-loving religion make it idealfor soft power diplomacy.

Compared to its vast population, Buddhism may be a minor religion in India. Yet India is in a position to claimlegitimacy in its promotion of Buddhist diplomacy for a variety of reasons. As we all know, Buddhism originated in India. We have in this country various historical sites associated with Buddhism like Bodh Gaya, Saranath and Nalanda. Thirdly, India has nurtured an image of being the protector of the persecuted due to the presence of the Dalai Lama in Dharmashala, although his presence in India continues to be a bone of contention between India and China. Successful synchronizing of these positive factors with other Buddhist countries like Sri Lanka and Thailand could have an impact beyond the realm of cultural diplomacy and assist in other areas of foreign policy as well. Deepening ties with Asian nations on the basis of Buddhism could potentially promote thelarger policy objectives of the Government, namely the 'Neighbourhood First'policy ofthe Modi Government. In fact, Prime Minister Modi has made it a point to visit historical sites associated with Buddhism and include it in his itinerary whenever he visits Asian countries, including China. He has made a conscious effort to emphasize shared

Buddhist heritage. Domestically, Modi has often spoken ona number of occasionshailing the importance of the Buddhist faith forthe development of both India and the world.

Inspite of all this, the fact remains that India receives only one percent of global Buddhist tourism. To remedy this and further project Buddhist religious tourism,the Ministry of Tourism is promoting a number of tourist circuits that transgress national borders. This also includes a tourist circuit that involves visits to various sites in Nepal, such as *Lumbini andKapilavasthu.*

In2015,the"HinduBuddhistInitiativeonConflictAvoidance"organized by the Vivekananda International Foundation and the Tokyo Foundation in Bodh Gaya was inaugurated by Shri Narendra Modi. The conference was of particular importance because ofthe emphasis laid on the relationship shared by Hinduism and Buddhism, which was projected as one of mutual benefit and growth rather than one of antagonism. The variety of India's soft power diplomacy has expanded the scope of soft power rhetoric, by allowing forshared cultural development instead of the export of cultural products. Yet inthepracticalrealmofpowerpolitics,andoftenduetomyopicoutburstsbysome politicians, Government of India has to go miles 'before it sleeps' when it comes to Buddhist diplomacy. But full credit should be given to the Government for having put its foot down and opening its mind in crystal clear terms regarding the sanctuary given to the Dalai Lama. But the Government should also use his good offices and involve him in the further development of the Nalanda University.

CONCLUSION

Modigovernment must movebeyond meretokenismlikevisitingtemples and conducting seminars. What India has in its favour is an abundance of resources including pilgrim sites, thepresence of the Dalai Lama, international goodwill and the right intentions. On an international level, the Government must ensure that it does not direct its efforts solely at Tibetan Buddhism exclusively but also at other Buddhist schools of thoughts. The NalandaUniversity project should be re-vitalized and Buddhist studies in well-established Central Universities and Deemed-to-be Universities should be encouraged with proper well qualified faculty. Diverse variety of thought that goes beyond just Tibetan Buddhism and the Dalai Lama should be encouraged in such centres of learning. The study of ancient languages like Pali in which a numberofBuddhisttextshavebeenwritten isimperativefortheholisticdevelopment of Buddhist academia. To conclude, promotion of Buddhist tourismreminiscent of the "Incredible India" campaign is required to popularize India's association with the faith internationally, coupled with proper management of tourist sites without tampering with the rituals.

Navigating Through a Neighborhood in Unrest - India's Diplomatic and Strategic Challenges

Albert Abraham
Former Faculty & Mentor, Civil Service Institute Pala

Once former Prime Minister Atal Bihari Vajpayee rightly remarked, ' You can change friends but not your neighbours'. This holds profound insight regarding the complexities of interaction with those around us. The same holds good for a nation-state also. As the narrative of emerging India getting boxed up in complex South Asia is gaining traction in global policy circles, Viksit Bharat should have a regional strategic policy to deftly navigate through a neighbourhood in unrest. This manoeuvring is crucial for regional balance of power and for claiming our proper place in a multi-polar world.

The shadow of the China factor looms large when it comes to India's diplomatic and strategic considerations in the neighbourhood. This consequential challenge is the result of massive power imbalance between two countries that disrupts the regional balance of power too. To what extent Viksit Bharat will be able to bridge the military and economic power gap and manage the Thucydides trap in the region will decide the long-term role of India in its neighbourhood. Any deal with China can only be a reprieve despite its necessity. For example, just after the October 21 deal resuming pre-2020 patrolling patterns in Depsang and Demchok and measures for disengagement, China came up with a massive dam plan in Brahmaputra and created two new counties in illegally occupied Ladakh part. While temporary measures to avoid the game of chicken are welcome, external balancing of China in the region and strengthening our internal capabilities should be the priority in the long run.

At present, the minimal diplomatic engagement with Pakistan and relatively calm border due to the military prowess of India are serving our strategic interests. Factors such as the growing power asymmetry and less dividends for Pakistan's attempts to internationalise the Kashmir issue can be the major reasons behind this calm. Internal political crisis and skirmishes with Taliban ruled Afghanistan also act as calming forces for the Pakistan. However, internal political climate and interests of deep state

there are not static. Thus, constant vigil and agility in strategic thinking is required from Indian side.

Among neighbours like Maldives, Nepal and Bangladesh, there are political factions which thrive on anti-India narratives. This makes it difficult to engage with all bands of the political spectrum in these countries. Due to the lack of bipartisan consensus in these countries, India's goodwill and Neighborhood First Policy is not reciprocated in full spirit. Pursuing a path of patient diplomacy can be the way ahead in this regard. In the case of Maldives, this has already yielded results. Recent Comprehensive Economic and Maritime Security Partnership and defence and economic cooperation after navigating through turbulent times a year back bring testimony to this. Insights from this diplomatic engagement can be used in the present diplomatic tussle with Bangladesh.

However, the present turmoil in Bangladesh is much more complex. Firstly, it has the potential to alter historical and time-tested relationships with the largest land border sharing country. Secondly, the interests and policies of the interim government are clearly against our interests and are getting an adequate welcome from the inimical opportunists. Thirdly, the depth of domestic political turmoil is so grave that the impacts of it will be tangibly felt across the border if situations do not improve in due course. Growing radicalisation and attacks on minorities can affect the goodwill of Indians and people-to-people ties. In addition, it will also put pressure on our diplomatic front to act without giving much time for strategic analysis. Both the regional and international players including the Chinese and new Trump administration will play their part in the evolving game. So we also need to calibrate our strategies accordingly. So is the present situation in Myanmar. Continued civil war involving military junta, pro-democracy protests and various ethnic groups creates another challenge in the North Eastern border. Ethnic affinity among the tribes across the border and economic and social linkages create potential spillover effects on our side of the border too.

When it comes to other neighbours like Sri Lanka and Bhutan too, the traditional advantage and privilege we had in foreign policy can no longer be taken for granted. This was clear when Sri Lanka moved towards Chinese funded infrastructure projects and ultimately ended in debt trap diplomacy. Though the present government is deftly balancing its

relation with the two large neighbours and ensured New Delhi that the island nation's soil will not be allowed for use against India's interests, we have to address the pending issues such as the fisherman dispute and implementation of thirteenth amendment of Sri Lankan constitution. From the support for economic stabilisation measures, these ties need to grow into physical and digital connectivity diplomacy as we have seen in the recent announcement of establishing electricity-grid connectivity and multi-product petroleum pipelines between both nations. Fear of finlandisation also drives the foreign policy choice of small neighbours in South Asia bluntly due to sheer territorial size differences. In the case of Bhutan, despite the privileges enjoyed by India on foreign policy matters, reports regarding negotiated land border settlements with China including chances of land swaps covering the Doklam plateau are a cause of grave concern.

Having analyzed the turbulent neighbourhood through which our diplomacy has to navigate, there are a few features that have become characteristic of the region. One is the decreased global interest in South Asia due to the existence of the global poly crisis on one side and the increased focus on the Indo-Pacific on the other due to revisionist Chinese power presence in the region. This is evident in the Trump administration's enduring commitment to the Indo-Pacific and Quad grouping despite advancing deglobalisation clouds. Secondly, South Asia continues to be the least integrated region with abysmal trade among the countries in the region and bilateral forums like SAARC have become dysfunctional long back. Deep-rooted bilateral issues have become stumbling blocks in any future regional cooperation. Thus, along with promoting alternative platforms like BIMSTEC, India also focused on bilateral engagement with players in the region. Though it requires more diplomatic energy and careful strategic planning, it has the advantage of small neighbours not band wagoning against big brother. Amidst the chaos, even after more than a quarter century, Gujral doctrine principles like non-reciprocity still hold relevance. Vikasit Bharat's ambitions of becoming a global player and champion of the global south will be difficult without being a dominant player in the region. In short, navigating through a neighborhood in unrest will be tough, but it will be worth to do so.

Collegium System and Judicial Independence

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Appointment to higher judiciary has been a controversial issue since the enactment of the Constitution). The constitutional provisions on the subject of appointment of judges of the Supreme Court (SC) and of the High Courts are contained in Articles 124 and 217. According to Article 124, every judge of the Supreme Court shall be appointed by the President by warrant under his hand and seal after consultation with such Judges of the Supreme Court and of the High Courts in the States as the President may deem necessary for this purpose and shall hold office until he attains the age of 65 years, provided that in the case of appointment of a Judge other than the Chief Justice, the Chief Justice of India shall always be consulted.

The article also provides that a person shall not be qualified for appointment as a Judge of the Supreme Court unless he is a citizen of India and has been for at least five years a Judge of a High Court or of two or more such Courts in succession; or has been for at least ten years an advocate of a High Court or of two or more such Courts in succession; or is, in the opinion of the President, a distinguished jurist.

Article 217 provides that every Judge of a High Court shall be appointed by the President by a warrant under his hand and seal after consultation with the Chief Justice of India, the Governor of the State, and, in the case of appointment of a Judge other than the Chief Justice, the Chief Justice of the High Court and shall hold office, in the case of an additional or acting Judge, as provided in Article 224 and in any other case, until he attains the age of sixty-two years. (This age was initially 60, but was raised to 62 as a result of subsequent amendment.)

Clause (2). of Article 217 provides that a person shall not be qualified for appointment as a judge of the High Court unless he is a citizen of India and has for at least ten years held a judicial office in the territory of India; or has for at least ten years been an advocate of a High Court or of two or more such Courts in succession; or is, in the opinion of the President, a distinguished jurist. The provision according to which the President could

also appoint a person who, in his opinion, was a distinguished jurist was added in Article 217 as a result of the 42nd amendment, and has since then, been deleted by the 44th Amendment.

Since parliamentary from of government is existing in India the appointment by President means appointment by the council of ministers since President is bound to follow the advice given by the council of ministers. So, the nature of consultation to be followed has become crucial since the consultation may be mere passing of information or discussion leading to concurrence or an action between the two.

In S P Gupta Vs Union of India (First Judges Case, 1981) a seven judge Constitution Bench of the Supreme Court held that the President of India is the final authority to appoint and he need not follow the advice of the judges whom he consults. It meant 'consultation' is not concurrence. In 1993 in Supreme Court Advocates-on-Record Association Vs Union of India (Second Judges case) a nine-judge Constitution Bench overruled the decision given in SP Gupta Case and devised a specific procedure called 'Collegium System' for the appointment and transfer of judges in the higher judiciary. The ultimate effect of the collegium system is that it accorded Primacy to the Chief Justice of India in matters of appointment and transfers while also ruling that the term 'consultation' would not diminish the primary role of the CJI in judicial appointments. The role of the CJI is primal in nature because, this being a topic within the judicial family, the executive cannot have an equal say in the matter.

In Third Judges Case known as in re Special Reference 1 of 1998, the decision in second judges' case was reaffirmed with minor modifications. It was held that the recommendation of appointment etc. should be made by the chief justice of India and his four senior-most colleagues instead of the earlier two and is referred to as the Collegium. Both the 1993 decision and the 1998 opinion lay down that the senior most judge of the SC should be made CJI. The decision in third Judges case was not delivered as the part of any a dispute but as an opinion delivered by the Supreme Court of India responding to a question of law regarding the collegium system, raised by then President of India K. R. Narayanan, in July 1998 under his constitutional powers.

In 2014 the Parliament enacted National Judicial Appointments Commission (NJAC) Act 2014 and the Constitution (99th Amendment) Act 2014 to scrap the collegium system of appointment of Judges. According to the

2014 system there shall be a Commission to be known as the National Judicial Appointments Commission consisting of the following, namely: —

(a) The Chief Justice of India as the ex officio chairperson.

(b) Two other senior Judges of the Supreme Court next to the Chief Justice of India as the ex officio members.

(c) The union minister in charge of Law and Justice as the ex officio member.

(d) Two eminent persons to be nominated by the committee consisting of the Prime Minister, the Chief Justice of India and the Leader of Opposition in the House of the People or where there is no such Leader of Opposition, then, the Leader of the single largest Opposition Party in the House of the People as members.

One of the eminent persons shall be nominated from amongst the persons belonging to the Scheduled Castes, the Scheduled Tribes, Other Backward Classes, Minorities or Women.

The duty of the National Judicial Appointments Commission is prescribed as to—

1. Recommend persons for appointment as Chief Justice of India, Judges of the Supreme Court, Chief Justices of High Courts and other Judges of High Courts.
2. Recommend transfer of Chief Justices and other Judges of High Courts from one High Court to any other High Court.
3. To ensure that the person recommended is of ability and integrity.

The constitutional validity of both the Ninety-Ninth Constitutional Amendment and the NJAC Act, 2014, was challenged in the Supreme Court in 2015.A constitutional bench of five judges with a majority of 4:1 struck down the NJAC, declaring them unconstitutional and void, stating that it posed a threat to the independence of the judiciary.

So, at present the collegium system is continuing. There is a view that the collegium system may ensure the independence of judiciary. According to Veepriya Ankit it “enhances secrecy within the judiciary, safeguarding it from political influences and ensuring effective functioning within the institution”. It may allow “ judges to work without fear or favor.”

Moreover "the system upholds the doctrine of the separation of powers, maintaining the judiciary's independence.

The Collegium, "comprising legal experts, is considered better equipped to assess the qualifications and suitability of judicial candidates compared to other selection methods."

(See International Journal of Research Publication and Reviews, Vol 5, no 3, pp 5149-5157 March 2024)

However, in some of the old democracies the executive has the role in the matter of appointment to higher judiciary.

In UK, SC judges are appointed by a five-member committee

It consists of the SC President, his deputy, and one member each appointed by the JACs of England, Scotland and Northern Ireland. [iii] (The JACs comprise lay persons, members of the judiciary and the Bar and make appointments of judges of lower courts.) In Canada the Appointments are made by the Governor in Council from a selection panel comprising five MPs (from the government and the opposition). In USA Supreme Court Justices are nominated by the President and confirmed by the Senate.

In Germany appointments are made by election. Half the members of the Federal Constitutional Court and others by legislature .In France Appointments are made by the President.

So, it is better to introduce a new system giving an effective role to both the executive and judiciary.

The Conundrum of Delimitation of Assembly Constituencies

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The delimitation exercise of parliament and assembly constituencies has been in public discussion as the country is nearing the 2026 census. The inauguration of the new parliamentary building, which has a capacity of 888, has intensified speculation about the delimitation and revision of Lok Sabha seats. Delimitation, which is the process of fixing the boundaries of constituencies and fixing the number of seats of Lok Sabha and Assembly constituencies, was frozen in 1971 till 2026 by a constitutional amendment. The Constitution avoids the "gerrymandering" of the constituencies through specific provisions; however, the Constitution of the Delimitation Commission and its functions are specified by the Delimitation Commission Act, an ordinary law. In a first-past-the-post election system versus a preferential voting system, delimitation is crucial for better representation.

In a representative democracy, the population determines the Lok Sabha and Assembly constituencies, as well as the number of seats from a state. Article 81 (2) of the Indian Constitution states that each state should have a number of seats in the House of the People based on its population, aiming to keep the ratio consistent across all states. Additionally, each state will be divided into constituencies, ensuring that the population-to-seats ratio within each constituency is as equal as possible across the state. An optimal delimitation of constituencies aims to achieve a harmonious equilibrium between the protection of minority groups, the guarantee of community representation, and the distribution of equal voting rights.

The process was frozen after the 1971 census through the 42nd and 84th Constitutional Amendments to encourage population control measures so that states with higher population growth do not end up having a higher number of seats. Over the past 50 years, our nation has experienced an uneven population expansion, with certain states—including Uttar Pradesh, Bihar, Madhya Pradesh, and Rajasthan—seeing larger increases

than others, like Kerala, Tamil Nadu, Karnataka, and Andhra Pradesh. The stark disparity in population between the country's north and south may result in inadequate representation in the Lok Sabha, which would undermine the nation's federal structure.

Do we need a delimitation exercise at this point in time? As per the 84th Constitutional Amendment, the exercise is frozen till 2026; therefore, the delimitation has to be carried out based on the census after 2026, i.e., 2031. However, the 2021 census has not come out and since 2026 is next year, the speculations for the same are high. After the 1991 and 2001 censuses, while Lok Sabha and Assembly seats remained the same, the constituencies were redrawn and the number of reserved seats in the legislatures was determined and identified.

One of the reasons for the necessity of the delimitation exercise is that India's population has increased to 1.42 billion in 2026, more than doubling from 547 million in 1971. The anomaly in the population in the states has caused an uneven representation in Lok Sabha and Assembly. Some of the elected candidates represent more population compared to others. The magnitude of the population in the respective Parliamentary and Assembly constituencies of all MPs and MLAs is not consistent, even within a single state. This is a result of the varying rates of population development in the various regions of a specific state.

The second reason is the passage of the much-awaited Women Reservation Act 2023, which reserves one-third of all seats for women in the Lok Sabha, state legislative assemblies, and the Legislative Assembly of the National Capital Territory of Delhi, including those reserved for SCs and STs.

Although the aforementioned factors necessitate delimitation, the delimitation exercise based on current parameters, such as population, can be problematic. Kerala, a southern state with a total fertility ratio (TFR) of 1.46 in 2021, effectively implemented robust family planning programmes, improved healthcare, and higher levels of education, leading to slower population growth. The average TFR of the southern states is approximately 1.6, which is lower than the replacement level of 2.1. Thus, the delimitation exercise would result in a loss of seats in Lok Sabha for states like Kerala and will result in a huge increase in seats for states like Uttar Pradesh that have a TFR of 2.4 and Bihar with a TFR of 3.5.

Table 1: If the number of seats is retained at 543 and reapportioned among States based on the projected population in 2026

State	Number of seats at present	Number of seats projected	Net gain/ loss
U.P.	80	91	11
Bihar	40	50	10
Rajasthan	25	31	6
M.P.	29	33	4
Tamil Nadu	39	31	-8
Andhra + Telangana	42	34	-8
Kerala	20	12	-8
Karnataka	28	26	-2
Punjab	13	12	-1
Himachal	4	3	-1
Uttarakhand	5	4	-1

Table 2: If the number of seats is increased to 848 based on the projected population in 2026

State	Number of seats at present	Number of seats projected	Net gain
U.P.	80	143	63
Bihar	40	79	39
Rajasthan	25	50	25
M.P.	29	52	23
Tamil Nadu	39	49	10
Andhra + Telangana	42	54	12
Kerala	20	20	-
Karnataka	28	41	13
Punjab	13	18	5
Himachal	4	4	-
Uttarakhand	5	7	2

Figure 1 - Net loss/gain in the seats in Lok Sabha in case of reapportionment of existing seats or increase the total number of seats.

Source: The Hindu, 7 February 2024

Way Forward

Considering the conundrum that the delimitation exercise would pose due to the uneven distribution of the population in different states and within the states, keeping the number of seats in Lok Sabha intact would not be a beneficial approach. There has to be a revision in the number of seats in the Lok Sabha for a better representation of the largest population in the world. This move can shift the political power to the northern states, as they gain more than 100 seats compared to the southern states, which gain around 20–23 seats together. This can be mitigated to an extent by taking the population count of qualified voters rather than the total population as well as maintaining the Rajya Sabha seats as they are. Another approach would be to keep the delimitation exercise frozen until population growth stabilises across states; however, that would violate the principles of democracy at large.

Out of the above options, to maintain federal principles and coherence, it is advisable to freeze the number of seats in Lok Sabha as it is

and increase the number of seats and constituencies in the Assembly elections as well as the local government elections. The state and local governments, being the implementing arm of the government, should have more representation for finding solutions that are localised and relevant to the general population in the state. A better devolution of powers to local self-governments with better representation through increased seats would ensure better governance and quick decision-making at the lower levels of government.

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One Nation, One Election: An Analysis of Ram Nath Kovind Committee Report

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India's democratic framework thrives on the vibrancy of its electoral process which enables citizens to shape governance actively at every level. Since independence, over 400 elections to the Lok Sabha and State Legislative Assemblies have showcased the strength of our democratic process. To further reform our electoral and democratic system One Nation, One Election campaign is getting momentum and widely discussing.

Concept of One Nation One Election

The 'One Nation, One Election' means holding simultaneous elections to the House of the People, all the State Legislative Assemblies, and local bodies. For this purpose, The Constitution 129th Amendment Bill, 2024, and The Union Territories Laws Amendment Bill, 2024 are tabled in the Parliament. These amendments propose new articles to enable simultaneous elections for the Lok Sabha and State Legislative Assemblies. Now the bills are being referred to the Joint Parliamentary Committee (JPC).

The concept of simultaneous elections is not a new idea in India. Following the adoption of the Constitution elections to the Lok Sabha and all State Legislative Assemblies were conducted simultaneously from 1951 to 1967. The first general elections to the Lok Sabha and State Assemblies were held together in 1951-52, a practice that continued for three subsequent general elections in 1957, 1962, and 1967.However, this cycle of synchronised elections was disrupted in 1968 and 1969 due to the premature dissolution of some State Legislative Assemblies.

The Fourth Lok Sabha was also dissolved prematurely in 1970, with fresh elections held in 1971. Unlike the First, Second, and Third Lok Sabha, which completed their full five-year terms, the Fifth Lok Sabha's term was extended until 1977 under Article 352 because of the declaration of Emergency. Since then, only a few Lok Sabha terms have lasted the full five years, such as the Eighth, Tenth, Fourteenth, and Fifteenth. Others, including the Sixth, Seventh, Ninth, Eleventh, Twelfth, and Thirteenth, were dissolved early. State Assemblies have faced similar disruptions over the years. Premature dissolutions and term extensions have become a

recurring challenge. These developments have firmly disrupted the cycle of simultaneous elections, leading to the current pattern of straggled electoral schedules across the country.

In 1999 the Law Commission headed by Justice Reddy recommended holding simultaneous elections. In 2015 the 79th Report of the Parliamentary Standing Committee reiterated its support for holding simultaneous elections. A working paper on simultaneous elections was prepared by NITI Aayog in 2017. The Law Commission came up with a working paper in 2018 stating that the possibility of holding simultaneous elections would require at least five constitutional changes.

Ram Nath Kovind Committee Report

The High-Level Committee on Simultaneous Elections, led by former President Ram Nath Kovind, has laid the groundwork for a transformative shift in India's electoral process. The High-Level Committee on Simultaneous Elections, headed by former President Ram Nath Kovind, was constituted by the Government of India on 2nd September 2023. Its primary objective was to explore the feasibility of conducting simultaneous elections for the Lok Sabha and State Legislative Assemblies. The committee solicited extensive public and political feedback, and consulted with experts to analyse the potential benefits and challenges associated with this proposed electoral reform.

The High-Level Committee Report on Simultaneous Elections in India, released in 2024, provided a comprehensive roadmap for implementing this vision. Its recommendations were accepted by the Union Cabinet on 18th September 2024, marking a significant step towards electoral reform. By aligning the election cycles of the Lok Sabha and State Legislative Assemblies, the committee's recommendations promise to address long-standing challenges associated with frequent elections, such as governance disruptions and resource wastage. The proposed phased approach to implementing simultaneous elections, along with constitutional amendments, could pave the way for a more efficient and stable electoral environment in India.

Major Recommendations of the Committee

The Ram Nath Kovind Committee Report talks about the insertion of an additional article 82 A through a constitutional amendment to alter the duration of the state assemblies in order to synchronize their term with the Lok Sabha. A series of constitutional amendments, dealing with the duration of the Lok Sabha and the state assemblies, duration of the assemblies in three Union Territories (Puducherry, Delhi, and Jammu and

Kashmir), elections in urban and rural wards, and a single electoral roll etc are recommended by the Committee.

The committee also proposed that the simultaneous elections must allow for the synchronization of operations of the Election Commission and several state elections commissions for the preparation of a single electoral roll, with the introduction of EPIC or Elector's Photo Identity Card. This will not only replace the conventional voter card but also eliminate redundancy in voting, thus creating a self-correction mechanism.

Insert Article 82 A: Article 82 A (1) will state that "on the date of the first sitting of the House of the People after a general election", the President will issue a notification bringing Article 82 A into effect. The date of this notification "shall be called the Appointed date". Article 82A (2) will state that "all the Legislative Assemblies constituted in any general election held after the appointed date shall come to an end on the expiry of the full term of the House of the People.

Amendment of Article 83 and Article 172: In case of a hung House, a no-confidence motion or defection, fresh elections is to be conducted to constitute the new Lok Sabha or State Assembly for the unexpired term of the immediately preceding full term of the House. It ensures continuity in cycle of Simultaneous Elections.

Introduction of Article 324 A: Relating to holding simultaneous elections to Municipalities and Panchayats with general elections. Ratification by states required.

Single electoral roll: To be prepared by the Election Commission of India in consultation with the State Election Commissions by amending Article 325. It includes amending State subjects (Local Government) in the 7th Schedule, Part IX, and Part IXA of the Constitution of India, ratification by the States required under Article 368 (2). The Committee observed that constitutional amendments in relation to terms of Parliament and state assemblies will not require ratification by states. However, constitutional amendments in relation to local bodies will be required to be passed with ratification by at least half of the states.

Implementation Group: Constitution of an Implementation Group is to monitor the execution of the process. This proposal aims to align the election process leading to cost cutting and better governance by eliminating election related disruptions. But the opposition is still against this bill criticising vested interests from the part of the Government

Balancing Power: The Dynamics Between Central Agencies and State Governments in India

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India's federal structure, which allocates powers between the central government and state governments, often gives rise to complex interactions between central investigative agencies and state authorities. These interactions can be co-operative, but they are also marked by frequent tensions, particularly when central agencies like *the Central Bureau of Investigation (CBI), the National Investigation Agency (NIA), and the Enforcement Directorate (ED)* get involved in investigations within state jurisdictions. This article examines how central agencies influence state governments and the challenges that arise from their operations.

The Role of Central Investigative Agencies

India's central investigative agencies are tasked with handling crimes that either have national implications or transcend state borders. These agencies operate with a broader mandate and are crucial for addressing issues such as corruption, terrorism, and economic crimes. However, their functioning often intersects with state law enforcement, raising concerns about the autonomy of state governments.

- ***Central Bureau of Investigation (CBI):*** The CBI is India's premier investigative agency, responsible for investigating cases related to corruption, serious crime, and national security. *Though the CBI has nationwide jurisdiction, it requires the consent of state governments to operate within their territory*. Many states, especially those governed by opposition parties, have withdrawn this consent, limiting the agency's ability to conduct investigations within their borders. This has led to accusations that the CBI is being used as a political tool by the central government.
- ***National Investigation Agency (NIA):*** Created in response to the 2008 Mumbai attacks, the NIA focuses on cases related to terrorism, national security, and other issues of national importance. *Unlike the CBI, the NIA does not require state consent to investigate within a state, which gives an advantage in matters of national security*. How-

ever, this freedom can sometimes cause friction with state governments, especially when the NIA investigates incidents that are seen as falling within state jurisdiction.

- ***Enforcement Directorate (ED):*** The ED investigates financial crimes, particularly those related to money laundering and violations of foreign exchange laws. It has gained prominence in recent years, especially in political cases involving high-profile individuals. The ED's investigations often raise questions about the misuse of power, with allegations of it being used to target political opponents.

Tensions Between Central Agencies and State Governments

The relationship between central agencies and state governments is often fraught with tension. While central agencies play an important role in maintaining national security and investigating serious crimes, their involvement in state matters can be seen as an infringement on state sovereignty. The major sources of tension include:

Political Allegations: One of the most significant sources of friction comes from accusations that central agencies are being misused for political purposes. Opposition parties often claim that central agencies such as the CBI and ED are used to target their leaders and stifle dissent. In several states, including West Bengal, Maharashtra, and Kerala, there have been allegations that central agencies are acting on behalf of the ruling party at the centre, undermining the principle of impartial law enforcement.

For instance, in 2022, Sharad Pawar, leader of the Nationalist Congress Party (NCP), accused the central government of using the CBI and ED to harass opposition leaders in Maharashtra and West Bengal. These allegations reflect the perception that central agencies may be used for political leverage, especially when there is a change of government at the centre or in states.

Withdrawal of Consent for CBI Investigations: A growing number of states have withdrawn or restricted the general consent that allows the CBI to investigate cases within their jurisdictions. States such as West Bengal, Kerala, Punjab, and Maharashtra have taken steps to limit the CBI's reach. This move has been described as a way to safeguard state autonomy and prevent the misuse of central agencies. However, it has also sparked off debates about whether the CBI's independence is being compromised.

In response, the central government has argued that the CBI's role is crucial for investigating national issues like corruption, terrorism, and financial crimes that affect the country as a whole. The tension over the withdrawal of consent has led to an ongoing battle between central and state authorities regarding jurisdiction and authority.

Centralization of Power: Some state governments view the increasing involvement of central agencies in state matters as a centralization of power at the national level. They argue that the central government's expansion of control through agencies like the NIA and ED undermines the autonomy of state governments in administering justice. The central government's influence over these agencies raises concerns about the concentration of investigative powers and the potential erosion of federal principles.

Examples of Tensions in Recent Times

Several incidents in recent years have highlighted the tension between central agencies and state governments.

- ***The Enforcement Directorate's Role in Political Cases:*** The Enforcement Directorate (ED) has increasingly been at the centre of controversies, particularly in its investigations against political leaders and business tycoons. Most recently, in states like Maharashtra and West Bengal, the ED's actions have been seen as politically motivated. The agency has been accused of investigating opposition leaders in these states under the pretext of financial crimes, raising questions about its impartiality.
- ***Investigations in West Bengal:*** West Bengal, under the leadership of Mamata Banerjee's Trinamool Congress (TMC), has been one of the most vocal critics of the CBI and ED. The state has repeatedly accused the central government of using these agencies to undermine the state government's legitimacy. In 2021, the TMC accused the CBI of interfering in state matters by investigating the state's handling of post-poll violence. The state government argued that the central agencies were acting without regard to state autonomy, further intensifying the divide between the state and central governments.
- ***The CBI's Handling of Corruption Cases:*** The CBI has also been accused of selective investigations in corruption cases, particularly when the accused are from opposition parties. The agency's involvement in high-profile cases such as the 2G spectrum case, coal scam

etc. has often been controversial. Political leaders in various states have accused the CBI of being used to target political opponents under the guise of fighting corruption.

Legal and Constitutional Implications

The tensions between central agencies and state governments raise important constitutional and legal questions regarding the limits of authority and jurisdiction. According to India's Constitution, both the centre and states have defined powers, but there is no clear delineation on how investigative powers are to be exercised when central agencies are involved.

The ***Delhi Special Police Establishment Act, 1946*** grants the CBI the authority to investigate cases involving national interest, but it also requires prior consent from the state government to intervene in state matters. The refusal of states to grant this consent has sparked debates about the scope of the CBI's powers and the concept of federalism in India.

Moving Forward: A Call for Greater Clarity

As the interplay between central investigative agencies and state governments continues to evolve, there is a need for greater clarity and legal frameworks to define their respective powers. Clear guidelines on when and how central agencies can intervene in state matters without infringing on state sovereignty would help mitigate tensions and ensure impartiality in law enforcement.

Furthermore, a robust mechanism for ensuring transparency and accountability in the functioning of these agencies would help address concerns about the misuse of power. A system of checks and balances, where both central and state agencies have clear roles, can foster cooperation and maintain the integrity of India's federal structure.

The dynamics between central investigative agencies and state governments reflect the challenges of balancing power in a federal system. While central agencies like the CBI, NIA, and ED play an essential role in investigating serious national issues, their involvement in state matters often raises concerns about autonomy and political bias. Addressing these issues requires a careful balancing act that respects both state sovereignty and the need for national coordination. Only through clarity in legal frameworks and transparent practices can India ensure that its investigative agencies work effectively and impartially across both state and central jurisdictions.

Electoral Bonds and The Question of Transparency

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Parties are the lifeline of parliamentary democracy. It is a fact that political parties need massive funds to sustain in the ever-evolving Indian political spectrum. Hence it is imperative to discuss political party funding to better understand the nuances of a parliamentary democratic system. Political funding is a cornerstone of democratic processes, influencing electoral integrity, governance, and public trust. In India, the Electoral Bond Scheme was introduced in 2018 to reform political donations by reducing the influence of unaccounted money. However, the scheme has been contentious due to concerns over transparency and potential misuse. This article examines the electoral bonds, their legal framework, implications, and the Supreme Court's verdict declaring the scheme unconstitutional.

Electoral bonds are bearer instruments similar to that of promissory notes, introduced in 2018. Indian citizens or entities can purchase these bonds from designated branches of the State Bank of India (SBI) in denominations ranging from ₹1,000 to ₹1 crore. The purchaser can donate the bonds to any eligible political party, which must encash them within 15 days. Notably, the donor's identity remains anonymous to the public, with only the SBI maintaining records of the purchaser's details. The government advocated electoral bonds as a means to curb black money in political funding by promoting donations through formal banking channels.

The Electoral Bond Scheme was established through amendments in the Finance Act, 2017, which modified several key legislations:

1. Foreign Contribution Regulation Act (FCRA), 2010: Amended to permit foreign companies with a majority stake in Indian firms to donate to political parties, potentially increasing foreign influence in Indian elections.
2. Representation of the People Act, 1951 (RoPA): Altered to exempt political parties from disclosing donations received via electoral

bonds, thereby reducing public transparency.

3. Reserve Bank of India Act, 1934: Enabled the government to authorize any scheduled bank to issue electoral bonds, diminishing the Reserve Bank of India's regulatory oversight.
4. Income Tax Act, 1961: Revised to exempt political parties from maintaining detailed records of contributions received through electoral bonds.
5. Companies Act, 2013: Removed the cap that limited corporate donations to 7.5% of a company's average net profits over the previous three years, allowing unlimited corporate contributions to political parties.

These legislative changes collectively transformed the landscape of political funding in India, introducing new dynamics in transparency and accountability.

Proponents of the Electoral Bond Scheme presented several arguments in favour of Electoral Bonds. Firstly, they argued that the scheme will incentivize donors to utilize formal financial channels, promoting cleaner political funding practices. By channelling political donations through banking systems, the scheme aimed to decrease cash-based contributions, thereby reducing unaccounted funds in politics and thereby reducing the black money in economy. Also, they argued that by providing a structured mechanism for donations, the scheme aimed to simplify the process of political contributions. Proponents further claimed that the scheme was beneficial for the donors too as the identity of the donor remains anonymous. To them, the concept of anonymity was intended to shield donors from potential political retribution, encouraging contributions without fear of adverse consequences.

Despite its intended objectives, the Electoral Bond Scheme faced substantial criticism. One of the primary concerns was the transparency deficit it created. The anonymity of donors prevented public scrutiny, thereby undermining the democratic principle of an informed citizenry. Voters were left unaware of the financial backing behind political parties, making it difficult to assess potential biases or influences in policymaking. Another major issue was the potential for corporate and foreign influence in Indian politics. The removal of donation caps, coupled with amendments to the Foreign Contribution Regulation Act (FCRA), allowed foreign-controlled Indian companies to contribute to political parties. This raised fears that corporate and foreign entities could exert disproportionate influence over

the political process, leading to policy decisions that serve private interests rather than the public good. The scheme was also criticized for its facilitation of money laundering. By enabling anonymous donations, electoral bonds created a loophole that could be exploited to channel illicit funds into the political system. This lack of traceability meant that black money could be easily legitimized without any accountability, further deepening concerns about corruption in electoral financing. Moreover, the scheme was seen as providing an unfair advantage to ruling parties. Data indicated that the party in power received a disproportionate share of donations through electoral bonds, leading to allegations of favouritism and quid pro quo arrangements between corporations and the government (crony capitalism). This imbalance in political funding raised concerns about the erosion of a level playing field in elections, ultimately affecting the fairness of the democratic process.

The opponents of the scheme adopted legal channels to oppose the system of funding. The Electoral Bond Scheme faced legal challenges on the grounds of violating the fundamental right to information under Article 19(1)(a) of the Indian Constitution. A five-judge Constitution Bench, led by then Chief Justice D.Y. Chandrachud, heard arguments highlighting the scheme's potential to increase corruption, black money circulation, and corporate influence in politics. The government defended the scheme, emphasizing donor confidentiality and the reduction of unaccounted cash transactions. On February 15th 2024, the Supreme Court unanimously declared that the Electoral Bond Scheme unconstitutional, stating that it violated citizens' right to information and compromised the transparency of political funding. The Court ordered an immediate halt to the sale of electoral bonds and directed the SBI to submit details of all electoral bond transactions to the Election Commission of India (ECI). The ECI was instructed to publish this information on its official website by March 13, 2024.

The Electoral Bond Scheme was introduced with the objective of cleansing political funding in India. However, its provisions for donor anonymity and the resulting opacity led to concerns about transparency and accountability. The Supreme Court's ruling to strike down the scheme marks a pivotal moment in India's democratic journey, emphasizing the importance of transparency in political financing. Moving forward, it is imperative to develop robust mechanisms that ensure clean and transparent political funding, thereby strengthening the foundations of India's democracy.

Comparing the GDPR and India's Digital Personal Data Protection Act, 2023: Impacts on Corporate Governance

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Abstract

The General Data Protection Regulation (GDPR) of the European Union and India's Digital Personal Data Protection Act, 2023 (DPDPA) are two landmark legislations designed to regulate the collection, processing, and storage of personal data. Both emphasize the protection of individual privacy while imposing stringent obligations on businesses. Despite their shared objectives, these laws differ in their scope, approach, and specific requirements, leading to distinct implications for corporate governance in their respective jurisdictions. This article provides a detailed comparison of the GDPR and the DPDPA, highlighting their key differences and examining their impacts on corporate governance.

Introduction

The GDPR, even-though adopted in 2016, came into full scale implementation in May 2018. It is a comprehensive data protection law applicable across the European Union, primarily aimed to harmonize data protection laws in the EU, protect the rights of individuals, and hold organizations accountable for how they handle personal data. The GDPR applies extra-territorially, covering organizations outside the EU if they process data of EU residents. (For example; amazon.com a US based company will have to comply to GDPR while handling EU customers data.)

India's Digital Personal Data Protection Act, 2023, on the other hand takes a more pragmatic approach, considering India's unique socio-economic and technological landscape. The Act seeks to balance. Made up of Section 43A and 87(2)(ob) of the Information Technology Act, 2000 and the Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011, the DPDPA aims to establish a regulatory framework for the protection of digital personal

data; seeking a balance to the rights of individuals with the need for innovation and economic growth.

GDPR Vs DPDPA

The table below highlights the key differences between the GDPR and DPDPA:

Parameter	GDPR (EU)	DPDPA (India)
Scope	Applies to all entities processing data of EU residents, regardless of location.	Applies to entities processing digital personal data within India or related to goods/services for Indians.
Consent	Consent must be explicit, informed, and freely given.	Consent must be free, specific, informed, and capable of withdrawal.
Extraterritorial Applicability	Covers non-EU entities offering goods/services or monitoring EU residents.	Covers non-Indian entities offering goods/services to Indian residents.
Data Subject Rights	Extensive rights, including access, rectification, erasure, portability, and objection.	Similar rights, but narrower scope (e.g., no explicit "portability" right).
Data Fiduciary Obligations	Requires detailed documentation, DPIAs, and appointment of DPOs for certain cases.	Obligations include data security, grievance redressal, and transparency.
Penalties	Fines up to €20 million or 4% of global turnover, whichever is higher.	Fines up to ₹250 crore (~€30 million).
Cross-Border Data Transfers	Allowed to countries with adequate protection or specific safeguards (e.g., SCCs).	Allowed to countries approved by the Indian government.

Government Exemptions	Limited exemptions for national security or public interest.	Broader exemptions for public order, security, and national interests.
Children's Data	Special protections for children under 16 (member states may lower to 13).	Special protections for children under 18, including parental consent.
Focus on Technology	Encourages "privacy by design and default."	Encourages a balanced approach, less prescriptive on technological measures.

Impacts of Regulatory frameworks on Corporate Governance

While both the GDPR and the DPDPA share the goal of protecting individual privacy, their approaches shape corporate governance in different ways and on different verticals.

Data Privacy as a Core Responsibility

The GDPR has elevated data privacy to a boardroom-level priority. Boards of directors are required to oversee data protection strategies, allocate resources for compliance, and ensure accountability for any breaches. This heightened focus is driven by the GDPR's steep penalties (to the tune of €20 million or 4% of a company's global annual turnover, whichever is greater) and the need for detailed documentation of compliance efforts. It is reported that Meta paid €1.2 billion and €390 million in 2023 for non-compliance.

While the DPDPA similarly emphasizes accountability, its requirements are comparatively less burdensome. Indian companies, particularly smaller businesses, may find compliance easier to achieve, but boards must still prioritize data governance as a strategic concern. The penalties range from INR 10,000 to INR 250 crore ($30 million depending on factors such as the nature, duration, and recurrence of the violation.

Accountability and Transparency

The principle of accountability underpins the GDPR. Organizations must maintain detailed records of data processing activities and implement "privacy by design" practices. Transparency is enforced through clear, comprehensive privacy notices and mechanisms for data subject requests. The DPDPA also requires transparency but adopts a less prescriptive ap-

proach. Companies must provide privacy notices and ensure grievance mechanisms are accessible, but the emphasis on detailed record-keeping is less stringent than the GDPR.

Cross-Border Data Transfers

For multinational companies, GDPR's strict rules on cross-border data transfers introduce significant challenges. Transfers are only permitted to countries with adequate protection or through specific mechanisms such as Standard Contractual Clauses (SCCs). On the other hand, the DPDPA provides a more flexible framework, on this vertical. It permits cross-border transfers to countries approved by the Indian government. However, organizations must monitor regulatory updates to ensure compliance with evolving rules.

Risk Management and Data Security

Corporate governance under GDPR must integrate robust risk management practices to address cybersecurity threats. Breach notification requirements (within 72 hours) and potential fines drive investments in data security technologies and incident response plans. The DPDPA, even-tough mandates data security measures, its requirements are less detailed. Companies are expected to implement "reasonable" safeguards, leaving room for interpretation. Boards must still ensure that cybersecurity is prioritized to avoid penalties and reputational harm.

Role of Data Protection Officers (DPOs)

The appointment of a DPO is mandatory for organizations involved in large-scale data processing or handling sensitive data. The DPO reports directly to senior management, ensuring an independent oversight role. The DPDPA on the contrary mandates DPOs only for organizations processing large volumes of data or sensitive data.

Cultural and Operational Shift

The GDPR requires a cultural shift within organizations to prioritize privacy and integrate it into daily operations. Employee training, privacy audits, and compliance monitoring become ongoing commitments. The process is less prescriptive in nature, allowing organizations more flexibility in implementation. However, businesses must still cultivate a culture of privacy awareness to build trust with stakeholders.

Best Practices for Corporate Governance

Both the GDPR and the DAPA pose significant challenges and opportunities in corporate governance. The challenges are high compliance costs and man power, particularly for small and medium enterprises (SMEs), navigating the complexities of cross-border operations. Uncertainty in specific guidelines, particularly given broad government exemptions, leads to uneven enforcement too. However, both regulations encourage companies to adopt better data governance practices, improving customer trust and competitive positioning. Investments in privacy and cybersecurity can enhance organizational resilience and reduce long-term risks.

To address the challenges and maximize the opportunities presented by the GDPR and DPDPA, companies may adopt the following best practices:

Establish a Privacy-Centric Culture: Foster awareness of data protection principles across all levels of the organization.

Leverage Technology: Use advanced tools for data mapping, encryption, and automated compliance monitoring.

Conduct Regular Audits: Periodically review data processing activities to identify gaps and ensure ongoing compliance.

Engage Stakeholders: Maintain transparent communication with customers, employees, and regulators about data protection efforts.

Monitor Regulatory Changes: Stay informed about updates to GDPR and DPDPA guidelines and adapt governance frameworks accordingly.

Empower Leadership: Ensure board members and senior executives are educated on data protection laws and their implications for corporate strategy.

The GDPR and DPDPA are the best examples of how global efforts in data protection have evolved to suit specific needs of regulations to enforce data privacy. In this regard, the GDPR stands tall with a very prescriptive and comprehensive approach, while DPDPA balances the need for privacy with the economic progress of the nation. From the perspective of corporate governance, the two regulations underline the need for accountability, transparency, and risk management. Businesses will have to view compliance not just as a legal obligation but as an opportunity to build trust, foster innovation, and strengthen their governance structures.

Private Sector Participation in India's Space Sector

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India has long been a key player in the global space sector, with the Indian Space Research Organisation (ISRO) leading its achievements. For many years, space exploration and satellite technology development were mainly under government control. However, recent changes have opened the door for private sector involvement. This shift, driven by policy reforms, technological progress, and the demand for economic growth through space-based services, has the potential to transform the industry. The rise of private companies in India's space sector could make it more competitive and self-sustaining.

Evolution of Private Participation in India's Space Sector:

For a long period of time, ISRO was the sole entity responsible for developing launch vehicles, satellites, and space exploration missions. While the private sector had a minor role as suppliers and vendors, it played no significant part in core space activities.

As space technology advanced rapidly and global commercial opportunities grew, India recognized the need to foster private sector involvement. The first major step towards privatization occurred in 1992 with the formation of Antrix Corporation, ISRO's commercial arm, which helped bring space technologies to the market. However, true liberalization of the space sector only began in the 21st century, particularly after 2020, when the Government of India introduced significant reforms to open the sector to private companies.

Policy Reforms Enabling Private Sector Participation

Several policy measures have facilitated private investment and participation in India's space industry.

1. IN-SPACe (Indian National Space Promotion and Authorization Centre)

In 2020, the Government of India announced the creation of IN-SPACe, a regulatory body to facilitate private companies' entry into the space sector. It acts as a single-window agency for private firms to collaborate with ISRO and access its facilities.

2. New Space Policy 2023

The Indian government released the Indian Space Policy 2023, which clearly outlines the roles of private players, ISRO, IN-SPACe, and NewSpace India Limited (NSIL). The policy emphasizes:

Encouraging private sector innovation in satellite launches, space-based services, and exploration.

Allowing private firms to build and operate satellites, launch vehicles, and ground stations.

Expanding commercial opportunities by allowing non-governmental entities (NGEs) to participate in all aspects of space activities.

3. NewSpace India Limited (NSIL)

Established in 2019 as a Public Sector Enterprise, NSIL manages commercial satellite operations and promotes private sector engagement. NSIL acts as a bridge between ISRO and private industries, focusing on commercial satellite launches and technology transfers.

4. FDI Reforms in Space

The Indian government is working to liberalize Foreign Direct Investment (FDI) in space to attract global investments. While currently restricted, future policies are expected to allow higher foreign participation in satellite and launch vehicle manufacturing.

The private sector in India's space industry is crucial for fostering innovation, enhancing cost efficiency, and accelerating technological advancements. Private companies can drive competition, leading to more affordable space services, and create new commercial opportunities in satellite launches, space tourism, and Earth observation. Additionally, public-private collaborations can help scale large projects, improve global competitiveness, and ensure that India's space capabilities align with national security needs.

ISRO has been increasingly collaborating with the private sector on several missions in recent years, reflecting a shift towards greater commercialization and private sector involvement in India's space endeavours. The PSLV-C47/Cartosat-3 mission in 2019 involved private players with contributions from companies working on small satellite technologies. ISRO has also collaborated with start-ups like Skyroot Aerospace and Agnikul Cosmos on the development of SSLV (Small Satellite Launch Vehicle), a new, cost-effective vehicle for smaller payloads. Additionally, in the Gaganyaan mission, private firms like L&T are contributing to critical infrastructure like the crew module and launch pad.

The space start-up ecosystem in India has attracted substantial investment

from both domestic and international sources. Venture capital, private equity, and government-backed funding have enabled many start-ups to scale their operations. For instance, Skyroot Aerospace, one of the leading private space start-ups in India, focuses on developing small satellite launch vehicles and made history in 2022 by becoming the first private company to launch a rocket. Similarly, Agnikul Cosmos, a Chennai-based company, is working on small satellite launch vehicles with the aim of providing more affordable and flexible solutions for launching satellites into space. Another notable player, Vesta Space, is known for designing and building small satellite systems, focusing on innovations in satellite propulsion and in-orbit servicing technologies. Additionally, Bharti Airtel, primarily a telecommunications company, is making strides in the space sector through its joint venture with OneWeb, which is working to provide broadband connectivity using a network of low Earth orbit (LEO) satellites. Together, these companies are playing a pivotal role in transforming India's private space sector.

SpaDeX and POEM4 are other significant milestones in increasing private participation in India's space sector, as they represent key steps towards fostering innovation, collaboration, and commercialization within the industry. SpaDeX is an event aimed at promoting innovation, knowledge-sharing, and collaboration among private companies, start-ups, and government organizations within the Indian space sector. It provides a platform where private players can showcase their capabilities, technologies, and project both ISRO and other stakeholders in the space industry. It has helped attract venture capital, funding, and partnerships by highlighting the potential of private players in India's growing space industry. POEM4 refers to a series of orbital missions facilitated by private companies with ISRO's support. This includes projects like small satellite launches and experimental payloads. It has helped create pathways for smaller, more cost-effective satellite launches, opening the door for private players to offer commercial satellite launch services, both domestically and internationally.

Private participation in India's space sector marks a transformative shift, opening up new avenues for innovation, economic growth, and global competitiveness. With the government's support, private players are contributing to the development of affordable launch vehicles, satellite systems, and space applications. The increasing involvement of the private sector not only enhances India's capabilities in space exploration and satellite deployment but also fosters job creation, skill development, and entrepreneurship, positioning India as a key player in the rapidly growing global space industry.

Independent Election Commission: The Need for a Fair Selection Process

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The independence of the Election Commission of India (ECI) is a cornerstone of India's democracy, ensuring that free and fair elections take place without political interference. However, recent legislative developments have raised serious concerns about the integrity of this institution. The Chief Election Commissioner and Other Election Commissioners (Appointment, Conditions of Service and Term of Office) Act, 2023, which came into force in December 2023, has drawn widespread criticism for its potential to undermine the ECI's independence.

The Role of the Chief Election Commissioner and the Process of Appointment

Historically, the process of selecting the Chief Election Commissioner (CEC) and other Election Commissioners (ECs) in India has been prone to political influence. Appointments were traditionally made by the President based on the recommendations of the Prime Minister, a process that many be considered open to executive manipulation. As such, the need for a transparent and impartial process to select members of the ECI has long been recognized.

In 2015, the Anoop Baranwal case brought these concerns to the forefront. The Supreme Court ruled that a Collegium-style system should be established for appointing members to the ECI. Under this framework, a committee consisting of the Prime Minister, Leader of the Opposition, and the Chief Justice of India (CJI) would advise the President on the selection of CECs and ECs. The Court's ruling aimed at preventing the government from exerting unilateral control over these crucial appointments and to protect the independence of the Election Commission.

The Chief Election Commissioner Act, 2023: A Shift in Power

However, the passage of the Chief Election Commissioner and Other Election Commissioners (Appointment, Conditions of Service and Term of Office) Act, 2023, has led to a reversal of this safeguard. The new Act formalizes the process of selecting members of the ECI, but it excludes the CJI from the selection panel. Instead, the process now involves a Search

Committee led by the Union Minister of Law and Justice, which will propose a list of candidates for consideration. The final decision rests with a Selection Committee consisting of the Prime Minister, a Union Cabinet Minister, and the Leader of the Opposition (LoP).

The exclusion of the CJI from this process has sparked widespread concern. Critics argue that removing judicial oversight over the appointments significantly tilts the balance of power in favor of the executive, potentially compromising the neutrality of the ECI. Senior advocate Prashant Bhushan, representing the Association for Democratic Reforms (ADR), emphasized that such a change undermines the impartiality of the Election Commission and could expose the institution to executive interference, undermining the very foundation of free and fair elections.

Supreme Court's Response and the Legal Challenge

The Supreme Court has stepped in to examine the constitutionality of the Act. A bench of Justices Surya Kant, Dipankar Datta, and Ujjal Bhuyan is set to hear petitions challenging the legislation. These petitions argue that the Act violates the principles outlined in the Anoop Baranwal case and endangers the autonomy of the ECI.

On January 12, 2024, the Supreme Court refused to stay the implementation of the Act, even as the government moved ahead with the appointment of two new Election Commissioners, Gyanesh Kumar and Sukhbir Singh Sandhu, under the provisions of the new law. Critics alleged procedural irregularities in the appointments, including claims that the Leader of the Opposition, Adhir Ranjan Chowdhury, was given insufficient time to evaluate the shortlisted candidates.

Despite these concerns, the Court allowed the appointments to proceed, signaling that it would address the broader constitutional issues raised by the Act in its hearings.

The Broader Implications: Erosion of Institutional Independence

The controversy surrounding the Chief Election Commissioner Act, 2023, is part of a broader debate over the balance of power between the judiciary and the executive in India. The exclusion of the CJI from the selection process represents a shift in the power dynamics governing the appointment of constitutional officeholders. Critics argue that this change undermines the principle of judicial independence and concentrates more power in the hands of the government.

In its defense, the government has argued that the law ensures political balance by including the Leader of the Opposition in the selection panel, while the involvement of a Union Cabinet Minister reflects executive accountability. However, opponents contend that the Act's framework

excessively empowers the executive branch, which could result in appointments that reflect the government's political agenda rather than an impartial commitment to upholding democratic values.

The Anoop Baranwal case, in which the Court had directed the formation of a selection committee with the CJI's participation, was seen as a step toward ensuring the Election Commission's independence. By removing the CJI, critics argue that the new law effectively erodes this safeguard, replacing a system designed to eliminate government control with one that allows for greater political influence over the ECI.

The Need for a Transparent and Independent Selection Process

The independence of the ECI is critical to ensuring that elections in India remain free, fair, and transparent. The Chief Election Commissioner and Election Commissioners play a vital role in overseeing the electoral process, and their appointment must be free from any political interference.

The debate over the Chief Election Commissioner Act, 2023, raises important questions about the structure and functioning of India's democratic institutions. Legal experts, civil society organizations, and opposition parties have raised concerns that the new law could compromise the autonomy of the ECI, which could have lasting implications for the electoral process in India.

To ensure the continued credibility of elections, India needs a transparent and independent process for appointing Election Commissioners—one that prevents undue political influence and upholds the integrity of democratic institutions. The Supreme Court's upcoming ruling on the Chief Election Commissioner Act will likely set a significant precedent for how the country balances executive power, judicial oversight, and institutional independence.

Conclusion

The Chief Election Commissioner and Other Election Commissioners (Appointment, Conditions of Service and Term of Office) Act, 2023, represents a critical juncture in the ongoing debate over the independence of the Election Commission. While the government defends the Act as a necessary step to formalize the appointment process, critics argue that it undermines the Election Commission's impartiality by giving the executive too much control over the selection of its members. As the Supreme Court prepares to hear the petitions, the outcome of this case will have far-reaching implications for India's democratic institutions. It will determine not only the constitutionality of the Chief Election Commissioner Act but also set a critical precedent for how the balance of power between the judiciary, executive, and legislature is maintained in the selection of key constitutional bodies.

Deficit Finance and Its Implications

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'It's the economy stupid,' a phrase used by the Bill Clinton presidential election campaign team in 1992, and popular ever since; it reflects the importance of economy in every aspect of a nation's governance, including elections. In inflation matters in elections, politicians have won and lost for effectively managing the economy and for the inability to do so. Matters that affect citizen's welfare such as health, education, literature or the arts – which apparently seem non-economic - are dominated by economic logic, particularly when it comes to investment. That's why a country is best served when its people keep their eye on its economic health. One of the important policy tools of governmental intervention in the economy is government expenditure through its fiscal policy. How much to spend and where to spend are important policy questions for government's fiscal policy makers. This article explores the contours of deficit financing.

Policy Instruments

There are two policy instruments that the governments across the world use to intervene in the economy – fiscal policy and monetary policy. Fiscal policy covers government's receipts and its expenditure. The most important fiscal policy document of a government is its budget document. Fiscal policy is managed through the government and monetary policy by the central bank, the Reserve Bank of India (RBI).

RBI's monetary policy determines the interest rate and cash reserve ratio, and therefore controls the money supply in the economy. Inflation targeting is the primary responsibility of monetary policy. The Reserve Bank of India and Government of India have signed the Monetary Policy Framework Agreement which made inflation targeting and achieving price stability the responsibilities of the RBI. As per this agreement, the RBI is responsible for containing inflation targets at 4% (with a standard deviation of 2%).

Budget

Budget is the common term used for the Annual Financial Statement of the government. Article 112 of the Constitution mandates that the President shall, in respect of every financial year, cause to be laid before both the

Houses of Parliament a statement of the estimated receipts and expenditure of the Government of India for that year. Budget document gives, in brief, the receipts and expenditure of the government. The receipts are tax revenues and other receipts such as dividends, interest, etc. It details the allocation of money -called outlay- in different sectors to be spent by different Ministries/Departments and also details of resources transferred by the Central Government to State and Union Territory Governments. Budget is the primary fiscal policy document which details the financial priorities of the Government. Influencing economic outcomes via fiscal policy is one of the core tenets of Keynesian economics

Budget Deficit and Managing Fiscal Imbalances

In simple terms, budget deficit occurs when government spends more money than it receives that is, when expenditure exceed revenue. The financial arrangements put in place to meet the deficit are called deficit financing.

Government expenditure is normally classified into two – capital expenditure and revenue expenditure. Capital expenditure relates to those expenditures which lead to long term benefits, for example, investment in infrastructure like roads, or buildings, or setting up of public enterprises or utilities. It has the potential of stimulating the economy. Borrowing to spend on capital expenditure is considered a good policy option as the revenue it is likely to generate economic activity which will raise revenue in future.

Revenue expenditure covers daily operational costs like salaries and maintenance costs of utilities, wages or rent. Revenue expenditure does not create long term benefit for the economy, but in the short term, it places additional money in consumers hands and thus stimulates the economy. Excess of revenue expenditure over revenue receipt causes revenue deficit. This means borrowing to meet the revenue expenditure (means you are living beyond your means), is unsustainable in the long run and has the potential to lead to a debt trap.

Government revenues arise from taxes and other sources. The receipts of the government are also classified into revenue receipts and capital receipts. Revenue receipts are the income that a government receives from its regular and recurring sources within the fiscal year like tax revenues. Government receives tax revenue from Direct Taxes such as Income Tax (income tax paid by individuals and non-corporate bodies) and Corporation Tax (income tax paid by companies) and Indirect Taxes, like the GST

and Customs. Revenue from other sources include receipts from fees, fines, penalties, interest receipts, dividends from public sector enterprises, etc. Capital receipts are non-recurring, in nature, including borrowings from within the country or abroad, disinvestment proceeds, etc. Capital receipts are utilized for capital expenditure like infrastructure development, capital projects, and repayment of debts.

Deficit Financing

Fiscal deficit of the Union Government indicates the excess of its total expenditure consisting of revenue and capital expenditures and loans and advances over its non-debt receipts. The government may meet this deficit by borrowing from RBI or by sale of bonds or other debt instruments. This results in creation of fiscal liabilities for the Union government. This makes the issue of debt sustainability critical. That is why economists watch the budget deficits closely.

Deficit Financing is the fiscal policy of the government to meet the expenditure in excess of revenue. This can be done by borrowing or minting money. Minting of money leads to excess liquidity in the market which has serious consequences like creating runaway inflation, and therefore not resorted to, in normal circumstances, leaving to debt as the preferred option.

The main objective of deficit financing in a developing country like India is to promote economic development. Government investment on capital assets like infrastructure pushes the country's GDP providing a stimulus to the economy. When revenue is not sufficient to meet the investments, deficit financing is essential for financing the development plans. Economic growth creates jobs and more opportunities. With the growth in the economy, the nation will be able to pay back the debts it incurred to meet the deficit. But if the deficit is used for meeting the revenue expenditure (regular expenditure for running the government like payment of salaries) and not for capital expenditure (which spurs growth), it could lead to a debt trap.

Why does deficit financing matter for the economy?

Deficit financing creates inflationary pressures on the economy, particularly, if borrowing is done is to meet revenue deficit or if currency is minted. When the government borrows money, it needs to pay interest on that money, creating a liability for future. Also, when the government borrows a lot, it can make interest rates go up for everyone. This makes it more ex-

pensive for businesses to borrow money for new projects or for people to take out loans. High-interest rates can slow down the economy. If deficit financing is undertaken for the purpose of building up useful capital assets, it is likely to improve productivity and ultimately increase the elasticity of supply curves. The increase in productivity acts as an antidote to inflation, making it temporary. Deficit financing is necessary to stimulate growth in a developing country like India.

Management of Fiscal Deficit – FRBM Act and Fiscal Glidepath

Internationally it has been accepted that a fiscal deficit of 3 per cent of GDP (Gross Domestic Product) is manageable. For example, the European Union has a rule that says its member countries should keep their deficit below 3 percent of GDP. India has set itself a target to keep its fiscal deficit at 3 per cent of GDP in the long run. The Fiscal Responsibility and Budget Management Act, 2003 (FRBM Act) requires the central government to ensure responsible fiscal management and long-term stability. The Act also requires the government to ensure prudential debt management through limits on borrowings, debt and deficits.

During the COVID-19 pandemic, economic activity slowed down and so the revenue of the government dipped. The budget deficit ballooned to 9.5% of GDP in 2020-21. Government of India is committed to bringing down the deficit but realised that it would be difficult to reach the 3 per cent target quickly. Fiscal glide path is a strategy set by the government to gradually reduce the fiscal deficit over time, aiming to prevent the negative impacts of unsustainable budget deficits on long-term economic growth. So, instead of 3 percent, the government set a new goal of 4.5 percent of GDP by 2025-26. Gradual reduction of deficit to reach the goal of 3% is the fiscal glidepath.

Conclusion

Deficit financing is a double-edged sword. While it can be a valuable tool for stimulating economic growth, especially in developing economies like India, it also poses risks if not managed prudently. Maintaining a sustainable level of debt, prioritizing capital expenditure over revenue expenditure, and carefully navigating the fiscal glide path are essential for ensuring that deficit financing contributes to long-term prosperity rather than creating future economic burdens. The ongoing debate about the optimal level of deficit financing in India highlights the complex trade-offs policymakers must consider as they strive to balance growth objectives with fiscal responsibility.

Future of Electric Vehicles in India: Opportunities and Challenges

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Abstract

The global automotive industry is undergoing a significant transformation with the shift towards electric mobility. India, the world's fourth-largest automobile market, is also embracing this change, driven by environmental concerns, government policies and technological advancements. Electric vehicles (EVs) are sustainable alternative to conventional internal combustion engine (ICE) vehicles, helping to reduce carbon emissions and dependence on fossil fuels. This article explores the current landscape of EVs in India, opportunities, the challenges faced and the way forward.

Introduction

Electric vehicle (EV) market in India is witnessing significant growth these days, mainly by the proactive policies of the government, increasing investment from manufacturers and the growing interest of the consumers. India's transition to electric mobility is not just an option, but is inevitable and crucial for sustainable development. Our country faces severe air pollution problems, particularly in the metropolitan cities. The transport sector is a significant contributor to air pollution due to the widespread use of internal combustion engine vehicles. According to the World Health Organization (WHO), several Indian cities are among the most polluted in the world. EVs, which produce zero tailpipe emissions, offer a cleaner alternative. In addition to the environmental concerns, India's heavy dependence on oil imports places a considerable burden on our economy. According to the government estimates, India imports about 85% of its crude oil needs, leading to trade deficits and vulnerability to global oil price fluctuations. By transitioning to EVs, India can reduce its oil dependency and improve energy security. With advancements in technology, incentives and infrastructural improvements, India is poised to become a global leader in electric mobility.

Government policies and initiatives

The Government of India has introduced various policies to promote

EV adoption. A major initiative is the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme, launched in 2015 to provide financial incentives for EV buyers and manufacturers. Its second phase, Fame-II, was launched in 2019, focusing on subsidies for electric two-wheelers, three-wheelers, four wheelers, transport buses and charging infrastructure. Another scheme is the Production-Linked Incentive (PLI) for boosting the domestic manufacturing of EV components, batteries and vehicles. PLI aims to enhance India's manufacturing capabilities and reduce dependence on imports. Our government also provides tax benefits and incentives on EVs and income tax deductions on interest paid for EV loans. The government, along with private firms, is focusing on developing EV charging infrastructures. The Ministry of power has set guidelines for public charging stations to encourage faster adoption. As one of the fastest-growing automobile markets globally, India's transition to an EV revolution presents both opportunities and challenges, as discussed below.

Opportunities in EV adoption

The Indian EV market has been witnessing rapid growth, particularly in the two-wheeler and three-wheeler segments. Leading companies like Ola Electric, Ather Energy and Hero Electric are driving innovation in this sector. Major carmakers such as Tata Motors, Mahindra & Mahindra, Hyundai, General Motors, Tesla, etc. have shown keen interest in India's EV market. The Tata Nexon EV has become one of the best-selling electric cars in India. Several state transport corporations are adopting electric buses for public transport. Battery costs, which constitute a major portion of EV prices, have been decreasing due to advancements in lithium-ion technology. The push for local battery manufacturing under the National Programme on Advanced Chemistry Cell (ACC) battery storage will further reduce costs.

Challenges in EV adoption

Despite the promising growth, several challenges hinder the widespread adoption of EVs in India. The main problem is the high initial cost of EVs (constitute around 40% of an EV's price) due to high battery costs. Although incentives help lower prices, many consumers still find EVs costly compared to petrol or diesel vehicles. India lacks a widespread and efficient EV charging infrastructure. The limited availability of charging stations, especially in rural areas, discourages potential buyers. Consumers

are also concerned about the limited driving range of EVs and the availability of charging stations on highways and in remote locations. The increasing use of lithium-ion batteries raises concerns about battery recycling and environmental impact. Developing sustainable battery disposal and recycling mechanisms are crucial. India currently imports a significant portion of its battery components, including lithium, cobalt, and nickel. To achieve self-reliance, India needs to develop indigenous supply chains and invest in alternative battery technologies. A significant increase in EV usage will put pressure on India's electricity grid. Integrating renewable energy sources like solar and wind into the EV charging ecosystem is essential to ensure sustainable growth.

Conclusion

India's transition to electric mobility is inevitable and crucial for sustainable development. While challenges remain, proactive government policies, technological advancements and increasing consumer acceptance are driving the EV revolution. The future looks promising, with the potential to transform urban mobility, reduce carbon footprints and drive economic growth. Strengthening local manufacturing, improving charging infrastructure and raising awareness will accelerate the adoption of electric vehicles in India.

Fiscal Federalism in India: Significance and Challenges

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(The author was an expert committee member of the Government of Kerala during the period of the XIV Finance Commission)

The term fiscal federalism was coined by Richard A. Musgrave, a German-born American economist, in 1959. It is a key concept in public finance which involves the division of responsibilities and the sharing of financial resources. It is a term that describes how the financial powers and responsibilities are to be divided between different levels of government in a country. It addresses the negotiations, perceptions and compromises that enable a federal system to work.

The major principles of fiscal federalism include: a) central government and state governments should maintain financial autonomy without undue dependence on each other; b) both should secure adequate funds for their expenses and c) the revenues of centre and state should increase in line with growing expenditure.

The theory of fiscal federalism suggests that a federal government can be effective in solving problems like income distribution and economic stability. Musgrave's theory of fiscal federalism requires that the federal government should be responsible for economic stabilization and income distribution. The goal of fiscal federalism is to ensure equitable growth and fiscal autonomy at all levels of government.

Fiscal Federalism and Finance Commission in India

Article 280 of the Indian constitution makes a provision for the appointment of a finance commission with a chairman and four other members to settle the issues relating to fiscal federalism. The major areas where recommendations are made relate to tax sharing between centre and the states, grants in aid and fiscal imbalances. Prior to the appointment of the first finance commission in 1952, the revenue sharing between the centre and the states was made as per the Otto Niemeyer and C.D. Deshmukh awards. All finance commissions up to the 10th Finance Commission recommended to share only two sources of tax revenue, namely personal income tax and union excise duty. Hence, it has been observed that there

was a heavy concentration of financial resources with the central government. This created serious imbalance between the centre and the states. The centre has elastic sources of revenue and inelastic functions and responsibilities whereas the state governments have inelastic sources of revenue and elastic functions and responsibilities.

The state governments have been demanding that the central government have to combine the yield from corporate tax and individual income tax for tax sharing purpose and to share a portion of the revenue from service tax (before the introduction of GST in 2017).

The 10th Finance Commission headed by Sri K.C. Pant recommended that the entire central taxes shall be put in the divisible pool and 29% of the tax revenue shall be shared among the state governments. The criteria adopted by the 10th Finance Commission included a) population-20% b) area-5% c) Poverty distance-60% d) infrastructure index-5% e) tax effort-10%. As per the recommendation of the 10th Finance Commission, the total devolution share of the major states was as follows

1. Andhra Pradesh-7.91
2. Bihar -11.29
3. Gujarat - 3.88
4. Karnataka-4.86
5. M.P- 7.4
6. Maharashtra-6.23
7. Tamil Nadu-6.12
8. UP-16.25
9. W.Bengal-6.84
10. Kerala -3.5
11. Rajasthan-4.97

The 12th Finance Commission recommended to share 30.5% of the total revenue to the state governments. The finance commission also recommended to give Rs. 25,000/-crore to the local bodies in order to strengthen the functioning of these institutions.

The 14th Finance Commission, headed by Y V Reddy, recommended 42% of the net tax proceeds of the central government to the state governments. It was indeed a significant step to reduce the fiscal imbalance between the centre and the state governments. The commission also recommended to give Rs. 2,87,436 crores to the Panchayat Raj and urban local bodies. The 15th Finance Commission reduced the share of the divisible pool from 42 % to 41%.

Challenges in fiscal federalism

The share of the southern states like Andhra Pradesh, Tamil Nadu, Karnataka and Kerala has been declining from the 10th finance commission onwards. This has caused horizontal fiscal imbalance among the states. For example, Kerala's share which was 3.8% during the 10th Finance Commission declined to 3.06% during the period of the 11th finance commission which further declined to 2.67% during the 12th finance commission. The award during the 15th finance commission was the lowest as it recommended only 1.92% of the central tax share. Similarly, the share of Karnataka declined from 4.71% (14th Finance Commission award) to 3.65% during the 15th Finance Commission award. Such reductions would affect the ability of these states to finance welfare schemes and other social commitments.

There is a major problem with regard to the Centrally Sponsored Schemes (CSS).The state governments have no role in the design and implementation of the CSS. Originally, the central government met 100% of the CSS outlay. But over the years, the share of the central outlay deceased from 100% to 60%. Hence, the state governments have to find additional resources to finance such schemes.

GST Related Issues: The introduction of GST in 2017 complicated the fiscal balance between the centre and the states. This led to the revenue reduction of the states between 19% and 33%. Delay in the sharing of IGST further complicates the financial resources of the states. It has reduced the ability of the state governments to impose taxes.

There is an allegation that the opposition ruled states are being discriminated against in the implementation of the CSS and in the allocation of the disaster management funds.

As per the provisions of the article 275 of the constitution, the state governments used to get grants-in-aid from the centre. But there has been a decline in the amount of grants-in-aid from Rs.1.95 lakh crore in 2015-16 to Rs.1.65 lakh crore in 2023-24.

Increase in the cess and surcharge which are not divisible. Immediately after the implementation of the report of the XIV finance commission which gave a handsome share of 42% to the state governments, the central government started to introduce new cess and surcharges which are not to be divided among the states. The amount went from Rs. 85,638 crore in 2015-16 to little over Rs. 5 lakh crores in 2024-25. These challenges pose severe threats to the sound principles of federal finance.

Beyond Income: Mapping the Complex Realities of Poverty Through the Lens of Multidimensional Poverty Index

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Introduction

Poverty in India is often perceived through the lens of income alone, but this narrow view fails to capture the complex and layered deprivations that millions of people experience daily. To address this gap, India has embraced a multidimensional approach to poverty assessment, incorporating factors such as health, education, and living standards.

The National Multidimensional Poverty Index (MPI), developed in collaboration with NITI Aayog, UNDP, and the Oxford Poverty and Human Development Initiative (OPHI), provides a more comprehensive understanding of poverty in India. By analysing data from the National Family Health Survey (NFHS), the MPI highlights the extent of deprivation in various aspects of life beyond mere income insufficiency.

Recent findings from the *National Multidimensional Poverty Index: A Progress Review 2023* reveal significant progress in reducing poverty across India. However, disparities persist among states, between rural and urban areas, and across different social groups. This paper explores the current state of multidimensional poverty in India, analyzes its key dimensions, and discusses the implications for policy and future interventions.

Understanding Multidimensional Poverty in India

Traditional income-based poverty measures, such as the Tendulkar or Rangarajan poverty lines, consider individuals poor if their income falls below a specific threshold. However, this method overlooks crucial aspects such as access to healthcare, education, and basic amenities. The MPI, on the other hand, evaluates poverty across three broad dimensions:

1. Health

Nutrition: Undernutrition remains a major issue, particularly among children under five.

Child Mortality: High infant and child mortality rates reflect poor healthcare access and maternal health conditions.

2. Education

Years of Schooling: Many children, especially in marginalized communities, do not complete primary or secondary education.

School Attendance: Disruptions due to economic hardship and lack of school infrastructure lead to poor attendance rates.

3. Standard of Living

Access to Clean Cooking Fuel: Dependence on firewood and kerosene leads to health hazards.

Sanitation: Lack of proper toilet facilities contributes to diseases and malnutrition.

Drinking Water: Unequal access to clean water disproportionately affects rural populations.

Electricity: While India has achieved near-universal electrification, outages and accessibility issues persist.

Housing: Poor-quality housing affects the safety and well-being of families.

Assets Ownership: Lack of essential assets such as mobile phones, televisions, or vehicles is an indicator of poverty.

Households deprived in at least one-third of these indicators are classified as multidimensionally poor.

Current Status of Multidimensional Poverty in India

National-Level Trends

According to the *National Multidimensional Poverty Index: A Progress Review 2023*, India has made remarkable strides in poverty reduction. The key findings include:

The proportion of people living in multidimensional poverty fell from **24.85% in 2015-16 to 14.96% in 2019-21**.

Approximately **135 million Indians** have exited multidimensional poverty in the past five years.

The intensity of poverty, which measures the average level of deprivation among the poor, decreased from **47.14% to 44.39%**.

These improvements indicate the success of welfare schemes such as the **Pradhan Mantri Awas Yojana (housing for the poor), Swachh Bharat Abhiyan (sanitation drive), and Ujjwala Yojana (LPG distribution for clean cooking fuel).**

State-Wise Disparities

Despite national progress, significant disparities exist among states:

Bihar (33.76%), **Jharkhand (28.81%)**, and **Uttar Pradesh (22.93%)** have the highest levels of multidimensional poverty.

States with the lowest poverty rates include **Kerala (0.55%)**, **Goa (3.76%)**, and **Tamil Nadu (4.89%)**.

Bihar witnessed the sharpest decline in multidimensional poverty, dropping by 18.13 percentage points since 2015-16.

The contrast between states highlights the need for region-specific policy measures to address localized challenges.

Rural-Urban Divide

The impact of poverty is significantly more pronounced in rural areas:

In **rural India**, multidimensional poverty fell from **32.59% to 19.28%**, whereas in **urban India**, it declined from **8.65% to 5.27%**.

Rural populations face greater deprivations in sanitation, access to clean water, and healthcare compared to their urban counterparts.

The urban-rural gap underscores the necessity of targeted rural development policies.

Key Policy Interventions Driving Change

India's reduction in multidimensional poverty is largely attributed to **proactive policy measures** aimed at improving living standards. Some notable government initiatives include:

Swachh Bharat Abhiyan (Clean India Mission): Contributed to a **21.8 percentage point reduction** in sanitation deprivation.

Pradhan Mantri Ujjwala Yojana: Helped reduce deprivation in clean cooking fuel by **14.6 percentage points**.

Ayushman Bharat (Health Insurance Scheme): Aimed at improving healthcare access for economically vulnerable populations.

National Education Policy (NEP 2020): Focuses on inclusive education, improving school infrastructure, and ensuring universal literacy.

While these policies have been instrumental in reducing poverty, **continued efforts are required to sustain the progress and address persisting inequalities.**

Challenges and the Way Forward

Challenges

Despite the progress, challenges remain:

Regional and Social Disparities: The benefits of poverty reduction programs are not evenly distributed.

Impact of COVID-19: The pandemic has reversed some gains in poverty reduction, particularly in employment and education.

Unemployment and Informal Sector Issues: A significant portion of

India's workforce remains in the informal sector with limited social security.

Gender Inequality: Women experience greater deprivation in education, healthcare, and asset ownership.

The Way Forward

To address these challenges, India needs to focus on:

1. **Strengthening Health and Education Systems** – Investing in quality healthcare and universal education is crucial.
2. **Enhancing Employment Opportunities** – Skill development programs can create sustainable livelihoods.
3. **Bridging the Urban-Rural Divide** – Rural infrastructure development can help improve living conditions.
4. **Expanding Social Protection Programs** – Strengthening safety nets for the most vulnerable groups is essential.
5. **Data-Driven Policy Making** – Regular assessments using MPI data will help in refining policies and ensuring targeted interventions.

Conclusion

India's journey in reducing multidimensional poverty is not only a **story of progress, but also of persisting challenges**. The country has successfully lifted **135 million people** out of multidimensional poverty over the past few years, yet disparities across states and communities highlight the need for continued efforts. By strengthening existing welfare programs, investing in education and healthcare, and ensuring economic opportunities for all, India can further accelerate its poverty reduction efforts. The multidimensional approach has proven to be a **more accurate and comprehensive** method of measuring poverty, paving the way for **inclusive and sustainable development**. As India moves forward, the focus should not only be on **reducing poverty figures but on ensuring that no one is left behind in the country's growth story**.

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The Digital Economy and Its Impact on the Society

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The information revolution, which began in the 1980s, has created tremendous changes. It has changed the level of technology, the way of doing business, the research methods, and even personal life. It has increased production and distribution efficiencies and changed all other aspects of the economic structure. The digital economy is rooted in the more extensive information technology base; both are often the same.

The digital economy is the economic activity that happens when people, businesses, devices, data, and operations connect through digital technology. It includes online money transfers, online commerce, and other important economic activities that can be done digitally.

The history of digitalisation goes way back to the 1930s; during this period, the concept of digitalisation took shape. Don Tapscott coined the term "Digital economy'' in his book The Digital Economy: Promise and Peril in the Age of Networked Intelligence. The components of the digital economy are e-business, e-commerce and e-business infrastructure. The extensive resources of data, knowledge, and services that can be disseminated online also fall under the broader digital economy framework. Innovations like the Internet of Things, Artificial intelligence, Virtual reality, blockchain and autonomous vehicles further widen the scope of the digital economy.

The Digital Economy is part of the extensive digital space or cyberspace framework, which means any virtual environment accessible through digital devices where users interact and share information. It includes social media platforms, online games, cloud storage platforms, Online marketplaces, digital mapping, data visualisation, and various other digital activities.

Current trends in digital space -The Indian scenario

A Ministry of Electronics and Information Technology Govt of India study estimated that India's digital economy stood at 11.74% of national income from 2022-23 and is likely to rise to 13.42% by 2024-25. The study further elaborates that while the traditional ICT sector remains the most significant component of the digital economy, digital platforms and the digitalisation of brick-and-mortar sectors are proliferating. The digitally enabling industry, which includes sectors such as information and communication-related services, telecommunications (traditionally called the ICT sector), and

manufacturing of electronic components, computers, and communication equipment, is the highest contributor, accounting for 7.83% of gross value added. The new digital industries, which include Big-Tech players, other digital platforms and intermediaries, and firms dependent on digital intermediaries, account for nearly 2% of gross value added. The digital contribution of three traditional industries (BFSI, trade, and education) amounts to 2% of the national gross value added. These figures indicate that India's digital economy is steadily moving beyond the realm of the ICT industries, diffusing across all parts of the economy through digital platforms.

From various data sources, it is seen that during the 2023-24 period, India's mobile subscription is 1,14 billion, average monthly data traffic of 18.4 GB,1.3 billion biometric IDs, digital payments of 1644 billion transactions, ICT service exports amounting to 162 billion USD. India's contribution to AI projects is the highest globally, with a 23% contribution. The figures show that India's share in the total development of the digital economy is on the rise.

The role of Digital space in Economic Development

The popularity of the digital space has been increasing since the time of COVID-19. It is now playing a crucial role in economic development. The digital space plays a crucial role in economic development by facilitating innovation, enabling new business models, improving access to information and markets, boosting productivity, creating new jobs, promoting inclusive growth across various sectors, and providing a digital platform for marketing and other related activities.

The advent of data analytics introduced different models for business strategies. The Individuals, Government and business sectors use different digital tools with easy and accurate results. Most of the applications and payments are now in digital form. The time people spend on tedious physical processes can be used for other productive purposes because of time-saving digital processes. Digital marketing, where purchasing and selling physical commodities online, is another innovation. The dissemination of data for research and development is again a crucial contribution to the digital space. We experience things that delight both ears and eyes with a single fingertip. Online education platforms and virtual classes are another revolution in this context. The emerging gig economy is a change that comes in the employment sector. The digital economy is all-inclusive since it is an alternative to the traditional mode of social behaviour with layers and partitions.

The Digital Economy and Environmental Sustainability

The environmental and climatic impacts of economic development will be mitigated through appropriate data analysis through digital means. Us-

ing digital tools, compilation, presentation, analysis, and prediction have become efficient and accurate. Sustainable practices in agriculture, natural calamities like floods, landslides, tsunamis, and other problems can be monitored through various data analytics models. The digital economy contributes much to the sustainability of the green economy. Further, generative AI technologies can be used to create ethical and transparent strategies for practising sustainable development models.

The Blockchain Technology

Blockchain is a new technology known as Distributed Ledger Technology. With the help of this technology, currency and anything else can be stored in digital format. In this technology, any digital asset is immutable and transparent through decentralisation. Blockchain technology can be used to create Bitcoin, the best-known cryptocurrency. Blockchain can also be used for supply chain management, travel management, sustainable resource management, and financial Inclusion.

The Generative AI

Generative AI is a new revolution in digital space—a wholesome change in the concept of digital space. It is a system in which algorithms produce text, images, audio, and video content. If we use it wisely, generative AI has numerous applications in every aspect of human activity. It will change the very nature of humanity's social and individual thought processes.

The digital divide

As the scope and activity of the digital economy widen, the digital divide is an important concern. The lack of digital education and the higher cost of accessing digital instruments prevent many people from reaping the benefits of digital technology. This creates economic, social, and educational inequality. The government and policymakers should take the necessary steps to overcome this problem.

The prospects of the digital economy in India

'Viksit Bharat' is the vision of the government to make India a developed nation within 100 years of independence. The digital economy has a crucial role to play in this regard. The government's policy is to digitalise all types of financial transactions. It recommends increased use of unified payment interfaces. Digital technologies like blockchain technology and Generative AI will improve productivity and efficiency in various sectors. Digital Economies' contribution to GDP and employment generation has been increasing substantially. The development of the digital economy is highly correlated with the nation's development.

AI is Reshaping Labour Market and Enterprise Development

Prof. Tojo Jose, Alumnus, CSIP

Developments in recent times like the rise of Deep Seek show that Artificial Intelligence (AI) is no longer a futuristic concept; rather, it is quickly transforming industries, reshaping skill requirements, and restructuring enterprise development. The process of AI's disruptive influence is fast unloading and its impact on the labour market and business landscape is even more powerful.

Already a significant stride of life including the academics, science, arts etc. is used to outsource a lot of their professional tasks to artificial intelligence platforms. In industry and services, automation is fast changing labour market fundamentals. In the next five years, there will be a clear idea about the pattern in which artificial intelligence is going to influence our life.

One surprising and agonizing development is that AI is taking over the cognitive functionality of human beings, especially by the large language models. Often, some of the popular cognitive functionalities like content creation, analyses and even communication are left to the task of artificial intelligence. This automation may enhance the productivity of economic engagements and work. At the same time, in the future, since these functions are done by AI, there will be less urge for the workforce and students to develop these skills and it becomes a matter of concern.

The AI is growing faster by automating products and services. From an economic analysis angle, a definition of AI is mandatory. Here, AI is a scenario where devices are taking their own guided decisions.Automation is the process where machines are performing activities backed by the cognitive power of artificial intelligence. Data are the input that configures the cognitive power of AI. Now, one should recognise that cognitive capability is the most important peculiarity of AI that has added power to it.

AI and labour displacement effects

One major debate that surrounds AI is its influence on the labour market. Undoubtedly, artificial intelligence is creating a tectonic shift in the labour market. Every production functionality is undergoing automation. Here, the first area is reducing the role of labour. For example, a surveillance system can be completely automatised and there, higher efficiency and accuracy can be achieved with AI supported machines doing the surveillance function.

Yet, the consolation factor is that despite the automation, labour is not going to lose its importance. Here, there is complementarity between labour and AI supported automation. AI can do some of the tasks. Complete control of a work flow should be managed by a human being. This is needed as automated instruments may fail in extreme cases, thereby producing losses and collapse of the system. In this context, the responsibility of the policy makers as well as labour market participants is to enhance the efficiency of labour to adapt AI oriented labour skills.

High skilled jobs and low skilled jobs

An early indication is that artificial intelligence is going to takeaway low skilled jobs. Already, manual employment is replaced by automated machines in several fields. For the employer and the industry, such replacement is rewarding and cost reducing.

On the other hand, AI is yet to develop the skill to take care of high reward jobs like that in medicine, engineering etc. Here also, AI has already produced several supportive tasks undertaking automated systems. Still, when it comes to high end tasks, AI becomes weak in customising its tasks to the required environments.

In general, the AI trends show that demand for cognitive, technical and task creating professionals may go up. At the same time, routine non-professional jobs may be undergoing automation.

Another emerging trend is that AI is going to reinforce the gig economy forces. Here, the industry may outsource and employ more temporary workers. The advantage is that perks, incentives, permanent workplace arrangements etc. are not needed. Similarly, higher flexibility to the intake and lay off of labourers may encourage employers to embrace the gig workers.

LLM oriented enterprise development

On the enterprise development arena, the LLMs are creating stronger impacts. The Open AI, Google NLP, Deep Seek, etc. have emerged as prominent large language model platforms. Their cognitive ability can be used to support new solutions to our socio-economic needs and tasks. Products and services can be configured based on these platforms. This means that in the near future, these entities will be transforming as google like platforms; the basis on which new business enterprises can be developed. Large Language Models (LLMs) have the potential to evolve into powerful platforms, reshaping the internet and business ecosystems in ways that challenge or even surpass the Google-based internet model.

Another area of transformation is the potential rise of A**I-driven operating systems** rather than just a search tool. Here, the work or task can be com-

pletely controlled by the AI driven operating systems. The job of the skilled people is to master such operating systems to meet the demand of the clients. In this context, a new and adaptive workforce becomes a necessity.

Already, LLMs like ChatGPT, Gemini, Google NLP, Claude, etc. are transitioning from mere tech tools to **foundational platforms. Here, various vendors are developing a** range of applications, products, and services based on the cognitive capabilities of LLMs. Unlike the typical google based model where just **information is collected**, LLMs offer **customised answers, help task execution, and support intelligent automation**. Understandably, there is a shift from **search-based browsing to conversational computing and AI-driven interaction**. What the Chat GPT is doing and the Google is providing through its web browser are supportive of this new trend.

If the current trend is an indicator, the bigger picture is that AI at the popular level is represented by LLMs and their applications at the end user level. For example, the Chat GPT's income comes mainly from ordinary users rather than from business enterprises. They were successful in depicting the platform as a tool that can help the usual individuals to complete their cognitive tasks.

Even more powerful is the applicability of LLMs to deliver enterprise solutions. A disruption is already undergoing in the enterprise world where several of the services like web design, image, video and other content generation are taken over by AI tools. Here, the next phase will be the rise of small language models where more custom and task specific AI models well be developed by leading players. In this context, the AI's rise is going to remarkably influence the way in which products and services are created and delivered.

The Small Language Models can be competitive as they require only less computational power and GPU requirements. SLMs can function in**local devices**like smartphones, edge devices, personal computers and hence may provide more customer and business specific services. Another advantage of SLMs is that they can be trained to be precise and specific to meet the demand of a particular sector. Their output can be more accurate and contextually relevant. At the same time, development of such SLMs require more skills and adaptability.

There is no question that the AI is transforming our work and life more quickly. Some of the immediate future changes are going to be shocking and unbelievable. Already, the dual use of AI is attracting much attention and there is potential weaponisation of the technology. From a labour market and enterprise angle, it is a necessity for every player, be the job seeker or entrepreneur to understand the change and to undergo the transition for one's own benefit.

Union Budget 2025 - Focused …Futuristic

CA Jomon K. George,
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India's Union Finance Minister, Ms. Nirmala Seetharam, presented the Budget 2025 in the Lok Sabha on 1st February 2025 in the backdrop of economic survey 2024-25 which projected a GDP growth of 6.30% to 6.80% for the financial year 2025-26.

With global economic uncertainties, inflationary pressures and geopolitical tensions shaping economic policies, this budget has aimed to maintain growth momentum while ensuring fiscal prudence and economic development. It endeavors to accelerate growth, secure inclusive development, invigorate private sector investment and enhance the spending power of India's rising middle class.

The budget highlights and focuses on four engines, viz:

- Agriculture
- MSMEs
- Investments
- Exports

The proposals are expounded below:

Agriculture as the 1st Engine of Development

Prime Minister Dhan-Dhaanya Krishi Yojana - Developing Agri Districts Programme

- The programme to be launched in partnership with the states, covering 100 districts with low productivity, moderate crop intensity and below-average credit parameters, to benefit 1.7 crore farmers.

Building Rural Prosperity and Resilience

- A comprehensive multi-sectoral programme to be launched in partnership with states to address under- employment in agriculture through skilling, investment, technology, and invigorating the rural economy.

  Phase-1 to cover 100 developing agri-districts.

Aatmanirbharta in Pulses

- Government to launch a 6-year "Mission for Aatmanirbharta in Pulses" with focus on Tur, Urad and Masoor.
- NAFED and NCCF to procure these pulses from farmers during the next 4 years.

Comprehensive Programme for Vegetables & Fruits

- A comprehensive programme to promote production, efficient supplies, processing, and remunerative prices for farmers to be launched in partnership with states.

National Mission on High Yielding Seeds

- A National Mission on High Yielding Seeds to be launched aiming at strengthening the research ecosystem, targeted development and propagation of seeds with high yield, and commercial availability of more than 100 seed varieties.

Fisheries

- Government to bring a framework for sustainable harnessing of fisheries from Indian Exclusive Economic Zone and High Seas, with a special focus on the Andaman & Nicobar and Lakshadweep Islands.

Enhanced Credit through KCC

- The loan limit under the Modified Interest Subvention Scheme to be enhanced from ₹ 3 lakh to ₹ 5 lakh for loans taken through the KCC.

MSMEs as the 2nd Engine of Development

Revision in classification criteria for MSMEs

- The investment and turnover limits for classification of all MSMEs to be enhanced to 2.5 and 2 times respectively.

Credit Cards for Micro Enterprises

- Customized Credit Cards with ₹ 5 lakh limit for micro enterprises registered on Udyam portal, 10 lakh cards to be issued in the first year.

Scheme for First-time Entrepreneurs

- A new scheme for 5 lakh women, Scheduled Castes and Scheduled Tribes first-time entrepreneurs to provide term-loans up to ₹ 2 crore in the next 5 years announced.

Manufacturing Mission - Furthering "Make in India"

- A National Manufacturing Mission covering small, medium and large industries for furthering "Make in India" announced.

Investment as the 3rd Engine of Development

i. **Investing in People**

Broadband Connectivity to Government Secondary Schools and PHCs

- Broadband connectivity to be provided to all Government secondary schools and primary health centres in rural areas under the Bharatnet project.

National Centres of Excellence for Skilling

- 5 National Centres of Excellence for skilling to be set up with global expertise and partnerships to equip our youth with the skills required for "Make for India, Make for the World" manufacturing.

Expansion of Capacity in IITs

- Additional infrastructure to be created in the 5 IITs started after 2014 to facilitate education for 6,500 more students.

Centre of Excellence in AI for Education

- A Centre of Excellence in Artificial Intelligence for education to be set up with a total outlay of ₹ 500 crore

Expansion of Medical Education

- 10,000 additional seats to be added in medical colleges and hospitals next year, adding to 75000 seats in the next 5 years.

Strengthening Urban Livelihoods

- A scheme was announced for the socio-economic uplift of urban workers to help them improve their incomes and have sustainable livelihood.

ii. **Investing in the Economy**

Public Private Partnership in Infrastructure

- Infrastructure-related ministries to come up with a 3-year pipeline of projects in PPP mode, States also encouraged.

Support to States for Infrastructure

- An outlay of ₹1.5 lakh crore proposed for the 50-year interest free loans to states for capital expenditure and incentives for reforms.

Maritime Development Fund

- A Maritime Development Fund with a corpus of ₹ 25,000 crore to be set up, with up to 49 per cent contribution by the Government, and the balance from ports and private sector.

UDAN - Regional Connectivity Scheme

- A modified UDAN scheme announced to enhance regional connectivity to 120 new destinations and carry 4 crore passengers in the next 10 years.
- Also, to support helipads and smaller airports in hilly, aspirational, and North East region districts.

Tourism for employment-led growth

- Top 50 tourist destination sites in the country to be developed in partnership with states through a challenge mode.

iii. **Investing in Innovation**

Research, Development and Innovation

- ₹20,000 crore to be allocated to implement private sector driven Research, Development and Innovation initiative announced in the July Budget.

Deep Tech Fund of Funds

- Deep Tech Fund of Funds to be explored to catalyze the next generation startups

Exports as the 4th Engine of Development

Export Promotion Mission

- An Export Promotion Mission, with sectoral and ministerial targets, driven jointly by the Ministries of Commerce, MSME, and Finance to be set up.

BharatTradeNet

- 'BharatTradeNet' (BTN) for international trade to be set-up as a unified platform for trade documentation and financing solutions.

National Framework for GCC

- A national framework to be formulated as guidance to states for promoting Global Capability Centres in emerging tier 2 cities.

DIRECT TAXATION

- No personal income tax payable up to income of Rs 12 lakhs.

The new tax table:

0-4 lakh rupees	Nil
4-8 lakh rupees	5 percent
8-12 lakh rupees	10 percent
12-16 lakh rupees	15 percent
16-20 lakh rupees	20 percent
20- 24 lakh rupees	25 percent
Above 24 lakh rupees	30 percent

- This limit will be Rs 12.75 lakh for salaried tax payers, due to standard deduction of Rs 75,000.
- The new structure will substantially reduce the taxes of the middle class and leave more money in their hands, boosting household consumption, savings and investment.
- Maximum marginal tax rate of 30% will apply to income above 24 lakhs only.
- There are no changes in Corporate Tax Rates.
- NGOs registration to remain valid for 10 years (currently 5 years).
- Limits for TDS/TCS substantially increased, reducing compliance burden. TDS on sale of goods eliminated.
- Revenue of about ₹ 1 lakh crore in direct taxes will be forgone.
- The proposed new Income-Tax Bill to be clear and direct in text

so as to make it simple to understand for taxpayers and tax administration, leading to tax certainty and reduced litigation.

The budget has a size of Rs 50.65 trillion. The Macro picture of the budget is given below:

Particulars	**Rs. Trillion**
Receipts	
Revenue Receipts	34.20
Capital Receipts	00.76
34.96	
Expenditure	
Revenue Expenditure	39.44
Capital Expenditure	11.21
50.65	
Revenue deficit	**05.24**
Fiscal deficit	**15.69**

The most striking Feature is the 11.21 trillion CAPEX (Infra Spend) Proposal.

Though fiscal deficit contained at 4.40% of GDP, interest payable on past borrowings accounting for 25% of the total expenditure, remains a concern. Fresh measures are thus initiated to reduce debt burden to 50% of GDP over the next four years.

A few of the policy highlights are:

Governance - A high level committee for regulatory reforms in being setup to rationalize and decriminalize provisions across multiple laws.

Start-Ups The sunset clause (The limit for registration) to become eligible for major tax benefits is extended to 1st April 2030. Credit guarantee cover is doubled to Rs. 20 crores.

FDI- 100% FDI allowed in Insurance Sector.

The budget thus attempts to seek a healthy balance between fiscal consolidation and boosting consumption.

At its core, the budget focuses on four strategic priorities: reviving consumption without fiscal profligacy, sustaining infrastructure investment, broadening financing access for MSMEs and reducing regulatory friction to enhance ease of doing business. These imperatives, if executed well could deepen India's growth foundations.

Rise in Gold Price and Its Implications for Financial Markets

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Gold price is a crucial indicator in the global financial market, serving as a reflection of economic health, investor sentiment and geopolitical risks. In recent years, the price of gold has experienced significant increases, with the value regularly breaking records. This surge is largely driven by various economic and geopolitical factors including monetary policies, inflation expectations and supply-demand dynamics. As the price of gold rises, it not only impacts on financial markets but also presents opportunities and challenges for investors, businesses and even entire economies. Understanding the factors influencing gold prices and the effects of these fluctuations is critical for anyone navigating the financial landscape.

Factors Affecting Fluctuations in Gold Prices

Gold is a unique commodity, with both intrinsic value and financial properties. Its price is influenced by several interrelated factors that reflect broader economic conditions and market behaviours.

Supply and Demand

At its core, the price of gold is driven by the classic economic principle of supply and demand. The demand for gold comes from four primary sources: central banks, jewellery, technology and investment. Among these, the most significant impact on price tends to come from investment demand. Investors often turn to gold when confidence in other assets, such as stocks or bonds, wanes, particularly during times of economic uncertainty. Additionally, when institutions such as banks or jewellery manufacturers increase their purchases, the demand for gold rises, putting upward pressure on its price. On the supply side, if gold mining production decreases or recovery rates fall, the reduced availability of gold can lead to higher prices.

International Economic Conditions and Monetary Policy

Economic indicators and central bank decisions play a significant role in influencing gold prices. A key factor here is monetary policy, particularly

interest rate decisions. For example, when the Federal Reserve raises or lowers interest rates, it affects inflation expectations, currency values and investor behaviour. A lower interest rate environment typically results in higher gold prices as investors look for alternatives to low-yielding assets like bonds. The Federal Reserve's actions in 2025, such as the potential interest rate cuts, have been a driving force behind the recent bullish sentiment in the gold market. As inflation expectations rise and the possibility of lower interest rates persists, gold becomes more attractive as a hedge against both inflation and economic instability.

Geopolitical Risks

Beyond monetary policy, geopolitical tensions are another major driver of gold demand. In times of political or economic instability; such as conflicts, elections, or military crises; investors often seek the relative safety of gold, increasing its price. Geopolitical uncertainty can trigger waves of risk aversion, as seen during periods of heightened conflict or global unrest. As more than 60 leadership elections are expected to take place worldwide, geopolitical risks are likely to remain a significant factor influencing gold prices in the coming years.

Implications for Investors and Businesses

The surge in gold prices has broad implications for investors and businesses. As gold becomes a more attractive investment option, many see it as a reliable hedge against inflation and economic uncertainty. The increased demand for gold has spurred growth in the gold market, benefiting related industries such as mining, jewellery manufacturing, and precious metal trading. This creates new opportunities for businesses involved in these sectors, driving job creation, increasing profits and contributing to economic growth.

However, as gold prices rise, so does their volatility, which can be a deterrent for some investors. The fluctuations in gold prices may lead to uncertainty, especially among those holding gold-related assets like bars or coins. A sudden drop in price can result in significant losses, prompting investors to reassess their portfolios. Additionally, if gold prices continue to rise, the purchasing power of consumers may shrink, limiting their ability to buy physical gold.

For individual investors, the growing value of gold presents both challenges and opportunities. While gold offers potential for returns, particularly as

a safe haven asset during times of financial instability, it also carries risks, especially when prices become overly inflated. The balancing act between securing returns through gold and managing the risk of price volatility is crucial for investors.

Impact on Financial Instruments and Financial Markets

The rise in gold prices can also have ripple effects on broader financial markets. As investors flock to gold, they may reduce their exposure to other asset classes like stocks and bonds, driving down the prices of these instruments. As investors shift their focus towards precious metals, financial markets could experience increased volatility, especially if large numbers of traders reallocate their portfolios in a short period.

Furthermore, the price surge in gold has contributed to the expansion of the gold industry. Mining, refining and jewellery sectors are benefiting from the increased demand for gold, resulting in a boost to the global economy. The growth of these industries creates additional jobs, stimulates innovation, and generates tax revenue, all of which can contribute to positive economic development. As businesses in these sectors expand, their stock prices typically rise, creating a virtuous cycle of growth and investment.

Gold Prices and Exchange Rates

The rise in gold prices can also influence exchange rates. When the value of gold increases, the assets held in gold by countries or regions become more valuable. This, in turn, can increase the monetary value of these regions' currencies, attracting foreign investment. The connection between gold prices and currency exchange rates is complex, however, as other factors like market sentiment and economic outlook also play a significant role in shaping currency values. In times of economic optimism, gold price fluctuations may have less of an impact on currency values, as investors prefer riskier assets with higher returns.

Financial Market Risk and Gold as a Safe Haven

Fluctuations in gold prices can exacerbate financial market risks. Investors seeking safer assets may pull funds from stock markets, creating downward pressure on equity prices. As gold becomes a more popular investment, the risk sensitivity in markets may increase, leading to greater volatility. Additionally, when market expectations shift towards lower interest rates, such as in the wake of Federal Reserve announcements, many investors

move into gold futures in anticipation of profiting from a lower interest rate environment. While gold is often seen as a hedge against inflation and market instability, its price can be volatile, particularly when central banks adjust interest rates or monetary policies.

Mitigating Risks and Protecting Investments

Investing in gold presents an opportunity to hedge against economic uncertainty, but it also carries risks. Gold price is subject to fluctuations driven by geopolitical risks, inflation expectations, and shifts in investor sentiment. To mitigate the potential for losses, investors should diversify their portfolios and consider gold a part of a broader investment strategy. Additionally, the gold options market offers a way for investors to hedge their positions, allowing them to manage risks more effectively.

As gold continues to evolve as both a commodity and an investment, understanding its potential to influence financial markets will be critical for investors and businesses alike. The challenge remains for financial experts to develop effective strategies to protect investments and minimize the impact of price volatility in an increasingly complex global economy.

In conclusion, the rise in gold prices has far-reaching implications for financial markets, individual investors, businesses and the global economy as a whole. While gold offers security during times of uncertainty, its volatility and complex relationship with other financial instruments make it a double-edged sword for investors. Careful monitoring of economic indicators, geopolitical risks, and market trends will be essential for navigating the evolving gold market in the coming years.

Circular Economy and Sustainability: Materials Science Perspective

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Introduction

The concept of Circular Economy (CE) has recently gained significant attention from both scientific and professional communities for its role in implementing sustainability principles (Winans et al., 2017). CE represents a paradigm shift from the traditional "linear" economy (take-make-dispose) to a "circular" approach that involves closing, slowing, and narrowing material flow loops. The fundamental idea behind CE is to reintegrate end-of-life products into the production cycle, rather than sending them to landfills. The concept of CE consists of two key components: "circular," which focuses on the technical cycle of materials, and "economy," which provides new opportunities and trends for economic and societal development (Nikolaou et al., 2021).

A classical triple-level framework has been widely used to analyze CE at different scales: micro, meso, and macro levels (Moraga et al., 2019). At the micro-level, circular business models assist firms in integrating CE principles into their production and operations (Kristensen and Mosgaard, 2020). The meso-level focuses on interfirm collaborations, where waste materials from one company become raw materials for another. Terms such as industrial ecology (Saavedra et al., 2018), industrial symbiosis (Domenech et al., 2019), eco-clusters (Nikolaou et al., 2016), and eco-industrial parks (Gómez et al., 2018) describe such co-operative models. At the macro-level, CE entails policies, tools, and strategies to promote circularity at city, regional, and national scales (Geng et al., 2012).

Another key discussion in CE literature involves its comparability with sustainability (Geissdoerfer et al., 2017). Following the micro-meso-macro framework, many circular business models incorporate sustainability principles such as reduce, reuse, recycle, and remanufacture (Bocken et al., 2018). At the meso-level, conceptual and empirical models facilitate the link between CE and sustainability (Saavedra et al., 2018). At the macro-level, significant discussions focus on integrating CE into national and regional sustainability strategies (Geissdoerfer et al., 2017).

Key Concepts from a Materials Science Perspective

Reuse – Prolonging Material Lifespan

A fundamental tenet of circular economy principles is reuse, which aims

to extend the lifecycle of materials and products. In materials science, this involves the reprocessing, surface engineering, and structural reinforcement of materials to restore or enhance their functional properties. Strategies such as remanufacturing, self-healing materials, and advanced coatings are instrumental in mitigating material degradation and enhancing durability.

For example, in polymer engineering, advancements in reversible cross-linked polymers enable repeated reshaping and healing of materials, thereby reducing waste. Similarly, the repurposing of high-performance alloys in aerospace and automotive applications extends material utility and decreases demand for primary resource extraction. Implementing reuse strategies at the molecular and structural levels is crucial for enhancing sustainability and reducing material waste.

Recycling – Engineering a Closed-Loop System

Recycling is pivotal in the circular economy, facilitating the transformation of end-of-life materials into new, functional products. Materials scientists play a crucial role in enhancing recycling methodologies, improving material recovery rates, and developing novel recycling technologies that maintain material integrity.

For instance, advancements in solvent-based recycling of polymers enable the separation of mixed plastics at a molecular level, preserving polymer properties for reuse. In metallurgy, electrochemical refining and hydrometallurgical techniques allow for the efficient recovery of critical metals such as lithium, cobalt, and rare earth elements from spent batteries and electronic waste. Additionally, the integration of bio-recycling, utilizing microbial and enzymatic pathways for polymer degradation, presents an emerging frontier in sustainable material management.

The effectiveness of recycling processes depends on material compatibility, contamination levels, and technological feasibility. Therefore, interdisciplinary collaboration between materials scientists, chemical engineers, and environmental scientists is essential to optimize recycling pathways and establish truly circular material flows.

Waste Reduction

A core principle of sustainable materials science is waste minimization through intelligent design and advanced processing techniques. The development of lightweight, high-strength composites, additive manufacturing technologies, and nanostructured materials enables significant reductions in material consumption without compromising performance.

For example, additive manufacturing (3D printing) allows precise material deposition, reducing production waste while optimizing mechanical properties. Additionally, the design of multi-functional materials—such as self-cleaning surfaces, energy-harvesting coatings, and phase-change materials—improves efficiency and reduces the need for frequent replacement, thereby lowering overall material demand.

The integration of computational material science and machine learning-driven material discovery further enhances material efficiency, enabling the design of low-waste, high-performance materials with minimal environmental impact. Policymakers, manufacturers, and research institutions must collaborate to promote material efficiency through technological innovation and sustainable design strategies.

Product Redesign – Rethinking Materials for Circularity

Product redesign is crucial in transitioning from a linear to a circular economy. By reengineering materials and product structures, scientists can create materials that are not only high-performing but also easily recoverable, repairable, and recyclable.

A key approach in materials redesign is the concept of **cradle-to-cradle** engineering, where materials are designed to be either perpetually recycled or safely biodegraded. For instance, the development of fully recyclable thermosetting polymers and reversible adhesives is enabling new paradigms in sustainable materials management. Additionally, innovations such as fiber-reinforced biodegradable composites in packaging and construction offer alternatives to conventional, non-degradable materials.

In the energy sector, advanced battery chemistries incorporating sodium-ion and solid-state electrolytes are improving the sustainability of energy storage systems by reducing reliance on scarce raw materials. Similarly, bio-based materials, such as fungal mycelium composites and algae-derived polymers, are paving the way for sustainable construction and packaging solutions.By prioritizing material redesign, industries can significantly reduce material depletion, enhance recyclability, and improve end-of-life recovery processes, thereby aligning product development with circular economy objectives.

Conclusion:

From a materials science standpoint, the circular economy presents a framework for developing sustainable, high-performance materials while minimizing waste and resource depletion. By integrating principles of reuse, recycling, waste reduction, and product redesign, materials scientists can drive innovation in sustainable materials, enhance resource efficiency, and contribute to global sustainability goals.A successful transition to a circular materials economy requires a multi-disciplinary approach, involving material engineers, policymakers, industries, and consumers. Governments must implement policies that incentivize material circularity, industries must invest in sustainable material technologies, and researchers must continue to explore innovative materials and processing techniques. Ultimately, the convergence of materials science and circular economy principles offers an opportunity to engineer a more sustainable future, where materials are designed for longevity, efficiency, and circularity, ensuring a resilient and resource-efficient economy for future generations.

ESG Considerations in Public Policy – Measures, Challenges and Solutions

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1 Introduction

The concept of ESG – Environment, Social and Governance is often discussed in the context of the corporate sector. However, it is necessary to discuss ESG and sustainability specifically in the context of the public sector as well. The r*aison d'être* of public sector in a market economy is to fill the gaps in social equity and sustainability overlooked by the private sector. Hence, environmental and social considerations are thought to be inherently interwoven into Government policies and public administration. However, there is a need for a more conscious, unified and structured approach towards environmental sustainability, social equity and governance parameters at all levels of policy-making, governance and public administration.

As India is gearing up towards realising the United Nations' Sustainable Development Goals (SDGs), the government think-tank NITI Aayog is spearheading the adoption and monitoring of the SDGs in the nation. Translating the lofty goals of the SDGs into reality requires integration of ESG aspects with every aspect of policy-making and administration, not just for standalone, piecemeal measures.

2 Implementing Sustainability Measures in Public Administration

2.1 Building sustainable infrastructure

Every state, district, city, town and village need infrastructure development, especially those that are seeking to attract investments. Often investment in infrastructure tends to be more oriented towards easing logistics and transport and oriented towards trade and commerce. However, building climate-resilient infrastructure is equally the need of the hour – especially, building flood-resistant roads and sustainable drainage systems. Come heavy rains and most metropolitan areas face severe flood-like situation, disrupting normal life and resulting in heavy monetary losses for the residents. Climate change may impact them more severely

in the times to come. The local authorities must devise a comprehensive plan focusing on building flood-resilient infrastructure, improving early warning systems in partnership with private volunteers, and enhancing drainage to mitigate urban flooding. Most importantly, continuous monitoring systems must be set up and repairs and maintenance work must be regularly undertaken. Metropolitan cities like Mumbai, Chennai[1] and the NCR are gearing up towards climate resilience. Mumbai has its own Climate Action Plan with key action areas including sustainable waste management, energy and air quality. In Kerala, there is a Local Action Plan on Climate Change under the aegis of Kerala Institute of Local Administration joining hands with the United Nations Development Programme. It must be remembered that climate resilience is not just being cyclone-ready, it is about the ability to manage droughts and famine due to poor harvests, sustained hot weather conditions leading to accelerated wear and tear of public infrastructure assets, and other aspects of climate change.

2.2 Moving away from fossil-fuel-based transport

Policies for encouraging non-motorized transport including the development of bicycle lanes and pedestrian-friendly measures should be undertaken. Dependence on motor vehicles should be reduced through appropriate measures like odd-even number car scheme, mandatory carpooling, and so on. Simultaneously, expansion of public transport must be undertaken to absorb the population choosing to forgo personal transport vehicles.

2.3 Promoting Renewable Energy

India has set an ambitious goal of achieving 500 GW of renewable energy capacity by 2030, with significant investments in solar and wind energy projects. It has already crossed a remarkable 200 GW.[2] In this journey, the National Action Plan on Climate Change launched in 2008 outlines India's strategy to shift from fossil fuels to renewable energy through its eight missions, including the National Solar Mission and the National Mission for Enhanced Energy Efficiency.[3] At the local level too, solar energy may be leveraged and energy efficiency standards may be mandated. Awareness campaigns for the public are also the need of the hour.

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1 https://resilientcitiesnetwork.org/chennai/

2 https://pib.gov.in/PressReleasePage.aspx?PRID=2073038#:~:text=Introduction,non%2Dfossil%20sources%20by%202030.

3 https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2065522#:~:text=The%20NAPCC%2C%20launched%20in%202008,ecosystems%2C%20and%20enhance%20ecosystem%20services.

2.4 Urban Planning for Sustainability

With the rising pollution levels, green cover in cities becomes more important. Further, for public health and recreation too, setting up parks, outdoor gyms and gardens becomes important. It is also important to plant more trees alongside roads to provide shade, increase green cover, absorb pollution and improve soil quality.

Waste management and circular economy practices also need to be emphasized with awareness campaigns and practical demonstrations for identifying and segregating dry wastes, wet wastes, bio- wastes, e-wastes and other hazardous wastes.

Measures like rainwater harvesting policies and other water conservation measures must be put in place to combat droughts. Crowd and traffic management in public spaces, events, tourist and entertainment spots should also be consciously looked into to ensure a safe, hygienic and peaceful experience for the population.

2.5 Building inclusive public spaces

Sustainability and ESG are not merely about the environment but concern inclusiveness and social equity too. Inclusive public spaces with amenities for the differently-abled and neurodivergent population is a must by equipping with ramps, braille instructions, sensory-friendly spaces, to the extent possible. Safety aspects must be a part of every public space – right from fire safety, women's safety and risks of fall and stampedes.

The above are only some of the measures promoting sustainability. With a comprehensive and unified approach, ESG will be a normal consideration in any activity in the public sphere.

3 Challenges and Solutions

Balancing growth and sustainability: The first challenge with integrating sustainability aspects in all critical decision-making is balancing economic growth with sustainability and managing the trade-offs. A unilateral "Growth at any cost" approach can no longer guide policy. A judicious mix of growth-oriented policy laden with sustainability safeguards is needed.

Capacity-building: In order to ensure ESG considerations percolate to the grassroots level; capacity-building at all levels, in Government offices, regulators, local bodies and in public sector enterprises is required. Sensitization and awareness campaigns on pollution levels, the importance of waste segregation, social and economic inequalities, climate change and other areas are required.

Resistance from industries: The next challenge is that policy implementation is likely to meet with challenges and resistance from industries. For example, despite warnings and actions, unauthorized emissions and effluent release from industries still continue. It requires willpower and stern action to tackle.

Funding gap: The most important one is sustainability finance. Just as businesses needs funds for a more sustainable model, Governments and public bodies do also need it. And for this purpose, green debt funding may be used. While the Indian Government has issued several thousands of crores worth of sovereign green bonds to fund sustainability measures, local bodies in need of funds can resort to muni-bonds. For example, local bodies of Indore, Pimpri-Chinchwad, Ahmedabad have resorted to muni-bonds for purposes like renewable energy, sewage treatment, water treatment, etc.[4] The challenge here lies in making the municipalities investment-ready by demonstrating creditworthiness and good governance.

4 Emerging Role of Civil Servants in Sustainability

There is a need for an integrated ESG-driven approach for policymaking and administration at all levels of the government machinery. Given this, the role of civil servants in driving sustainable governance will be immense in the coming days. Civil servants, being the eyes and ears of the policy makers, play a vital role in shaping public policy. Their observations, experience and wisdom can help frame effective policy frameworks. Further, they are the implementation arm of the policy makers as well. The successful execution of policies requires a hands-on, impartial and courageous approach that only civil servants can bring to the table.

5 Conclusion

India, being the most populous nation, with a diverse geography, is susceptible both to climate risks and to the repercussions of social and economic inequity. In order for the public to have faith in their governments and authorities, it is also necessary to demonstrate fairness, transparency, responsibility and accountability – the tenets of good governance. This makes the concept of ESG very relevant in public policy and administration. With more civil servants taking up the cause of sustainability and ESG, India as a nation is bound to become more resilient and stronger – a true superpower inside out.

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4 https://www.sebi.gov.in/statistics/municipalbonds.html

Vagabonds of the Vagaries of Weather: The Looming Threat of Climate Refugees in India

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One of the profound consequences of climate change is the emergence of climate refugees. They are people who are forced to flee their homes owing to the adverse impact of climate related events.

The concept of climate migrants was first introduced in 1976 by Lester Brown who coined the term 'environmental refugees'. In 1985 Essam El-Hinnawi used the term and described these refugees as people who are compelled to depart either permanently or temporarily from their native lands following environmental disasters which not only has put their lives at risk but also degraded their quality of life. Various terms like climate refugee, climate migrant and environmental migrants have been coined to refer to the people displaced by climate induced disasters.

Climate refugees in India refers to people who are permanently displaced from their homes due to extreme weather events or climate change impacts like rising sea levels, floods, droughts or heat waves. The phenomenon of displacement has been a known experience in places prone to natural disasters like landslides, cyclones, floods or coastal submergence. However, they had been temporary displacements. Once the Vagaries of the weather subsided, the residents could return and reclaim their homes. However, in the light of climatic changes, several residential regions of our country are turning out to be non- ecumene. Hence the phenomenon of climate migration has become more regular, more widespread and more massive for our country with a huge population pressure even in ecologically fragile regions.

India ranks 7th in the Global Climate Risks Index. The regions that have witnessed increased climate migration in the past one decade include the Himalayan belt, Coromandal coast, deltaic regions like the Sunderbans and low-lying islands. Estimates suggest that by 2050, around 45 million people in India could be displaced due to climate change. The numbers of this large potential displacement have been reported by Climate Action

Network South Asia (CANSA). Factors that contribute to climate migration include extreme heat events, declining water availability, sea level rise, diminishing snow pack and decreasing crop yields. The causal factors of climate migration can either be sudden events or gradual environmental changes. Climate change induces migration through intensified natural disasters, impact on agriculture and water access, vulnerability of coastal regions and resource induced conflicts.

People who are forcibly displaced by adverse climate conditions encounter stigma and violence in places where they seek refuge. Today there are several countries in the world with large number of climate refugees. Countries like Vietnam, Democratic Republic of Congo, the USA, Brazil, Ethiopia, Somalia and Bangladesh experience large internal displacements due to natural disasters. The World Economic Forum reports that over 20 million people annually became climate refugees between 2008 and 2016 due to extreme weather events. The World Bank projects that by 2050, 1.2 billion people could become environmental refugees with more than 20 million climate migrants in South Asia alone.

Why Climate Refugees a concern for India?

1. Huge population pressure and potential for large scale displacements

India is today the most populated country in the world. Even though several places in India are still branded as villages, the population density of several villages are much more than that of cities of the Western world. Climate refugees are primarily internal displacements within our borders and could lead to regional imbalances, stress on resources, conflicts and administrative concerns. About 5 crores floating and unsettled people could be a headache for both regional and central governments.

Climate Action Network South Asia (CANSA's) 2020 report on climate refugees points out that even if the global community achieves Green House Gas Emission targets, 37.5 million people will be displaced by 2030 and 63 million by 2050 in the five South Asian countries of India, Bangladesh, Nepal Pakistan and Sri Lanka. India alone will have 45 million refugees. It will be three times the current number of people on the move as a result of extreme weather events.

2. Steady increase in the number of Climate Refugees

From 2020 to 2025, India has been recording a steady increase in the number of refugees. The number of refugees is increasing by 5 to 15% annually.

According to the State of India's Environment report, India is the 4th worst hit country in the world when it comes to climate change. Around 3 million people are displaced every year due to climatic factors. According to the Internal Displacement Monitoring Centre (IDMC), there are currently 15 million people in India displaced due to climate change.

3. Cross Border Refugee Threats

India's neighbouring countries like Bangladesh and Myanmar have large and increasing number of climate refugees. The threat of cross border mobility and relocation of refugees can cause headaches for our country in addition to internal climatic displacements.

4. Lack of a comprehensive Climate Refugee Policy

India currently lacks a formal policy framework for addressing the issue of climate migration. There should be laws for recognising, accepting, protecting and relocating climate refugees in the country. Climate refugees remain formally undefined, unrecognised and unprotected even under international law.

5. Coastal Vulnerability

India has a long coastline of more than 7000 km and coastal regions of our country are one of the most densely populated regions. Indian coastlines are susceptible to rising sea levels causing displacement for coastal communities

6. Extreme weather events

The number and magnitude of extreme weather events have been increasing in our country. Events like cyclones floods and prolonged droughts significantly contribute to internal displacement within India. According to data from India's Internal Displacement Monitoring Centre, an estimated 14 million people were forced to migrate in India in 2020. The recent Yale Program on Climate Change Communication show that 14% Indians have already migrated due to weather related disasters.

7. Rural- Urban migration dynamics

Rising rural distress coupled with an economic growth focus on urban areas is leading to increased migration from rural to urban settings. Climate change increases this trend by pushing more individuals to seek livelihood in cities.

Key Challenges Faced by Climate Refugees

* Loss of homes and disrupted livelihoods
* Humanitarian needs and basic services
• Food insecurity and malnutrition
* Health risks and Disease Outbreaks
* Social Dislocation and loss of community
* Protection and Security concerns as well as exploitations like forced labour or prostitution.
* Limited access to basic services or infrastructure as climate refugees often live in remote areas, informal settlements or overcrowded camps.

The challenges for addressing climate migration are many. First of all, Climate Refugees are not clearly defined. The world still lacks a legal framework to address climate refugees and they are not covered by the Geneva Convention of 1951. Secondly, lack of systematic data regarding the triggering events, the total number of migrants and the pattern of their settlements also hinder the policy making process. India's specific challenges in tackling the issue also include its vast size and high poverty levels, dynamics of rural - urban migration and the unplanned expansion of the cities. For example, the climate migration from the salinity encroached agricultural lands of Sunderbans delta has been expressed as a slow migration of labour force from the agricultural sector to the urban construction sector over the past one decade. Such migrations are too slow to be accounted as climatic migration. Only catastrophic events and consequent migration remain demographically tangible even today.

Global efforts to address the issue of climate migration

Globally, countries have come forward to acknowledge climate migration as a looming threat. Efforts and measures are initiated by several countries to tackle climate changes and consequent migration. Countries

like Bangladesh are investing in coastal embankments and flood resistant infrastructure to protect communities from rising sea levels and storm surges. Island nations like Fiji are exploring innovative solutions like raising land masses to adapt to rising sea levels. Kiribati is attempting a planned relocation of its population. Early warning systems for floods, cyclones and other extreme weather events have been implemented in countries like India and Vietnam. Bilateral agreements have been reached by countries like Australia and New Zealand to tackle migrants from Pacific Islands.

Attempts at Climate Migration Policy in India

In 2008, India launched the National Action Plan on Climate Change (NAPCC). It laid down a broad framework to address what India could do to tackle climate change in different sectors. In 2022, an MP from Assam introduced Climate Migrants (Protection and Rehabilitation) Bill as a private bill in the parliament but it was not passed. India lacks a policy on climate migration despite being a signatory to UN's Sendai Framework. The United Nations Framework Convention on Climate Change (UNFCCC) also recognises the subject of migration and relocation. COP29, the UN climate summit at Baku, Azerbaijan in 2025 is expected to discuss the various aspects of Climate Refugee policy.

Even though India is a leading policy maker in several international forums today, it still lacks a comprehensive policy regarding climate migration. This question requires urgent attention of Indian policy makers and politicians if India is to mitigate, if not tackle, this issue which is going to threaten a significant percent of its population in the near future.

Nuclear Fusion for Energy Production – The Idea and the Current Status

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A major chunk of energy now being used is from unsustainable sources. It is a known fact that the worldwide energy demand is expected to increase greatly in the coming decades, especially in developing nations. The energy demand is correlated with the standard of living. This necessitates the development of a safe, clean and sustainable energy source. On comparing various possibilities, nuclear fusion, the process by which certain light atomic nuclei react with each other and fuse to release energy, appears as a bright candidate for fulfilling the energy needs of mankind.

The topic nuclear fusion is always related to our existence in the universe. We know that solar energy is essential for giving an ambience, perfectly suitable for the existence of life on earth. Nuclear fusion is the fundamental mechanism of energy production in the sun and stars. The fusion of two nuclei into one is not possible under standard temperature and pressure because the repulsive Coulomb force between the positive charges of atomic nuclei prevents them from coming into the required close proximity of around 10^{-15} m, before they can coalesce into one nucleus. However, if the temperature is raised to around 15 million degrees (as in the sun's core), hydrogen gas becomes plasma - the 4^{th} state of matter. Under plasma state, the negatively charged electrons in atoms are completely separated out from the positively charged atomic nuclei and become positive ions. Thus, creation of the plasma state is the first requirement. Once such a condition is reached, the gravitational force confines the positively charged hydrogen nuclei and the high temperature causes them to move around each other and as a result, they collide at high speeds overcoming the electrostatic repulsion that exists between the positive charges and subsequently fuse to form the heavier helium. (This is the case in stars as in the sun).

The studies on nuclear fusion for energy production, needs a broad background knowledge of several disciplines in physics such as plasma physics, atomic physics, electromagnetics, materials science,

computational modelling, superconducting magnetic technology, accelerators, lasers, health physics, etc. Though they seem disparate subjects, nuclear fusion research combines them and develops a very concise and coherent foundation to both fusion science and fusion technology. It makes use of almost all the aspects of physics. Thus, fusion research is of multifaceted nature.

Advancement in nuclear fusion goes hand in hand with developments in plasma physics. In India, the major centre for developmental activities related to theoretical and experimental studies on plasma physics, with the focus towards understanding space plasma phenomenon is the Institute of Plasma Research (IPR), Ahmedabad. Confinement of plasma is the major challenge in plasma research to achieve nuclear fusion for energy production. Plasma confinement is the containment of plasma by applying various forces, in order to maintain the extreme critical conditions necessary for initiating nuclear fusion. In stars these conditions exist naturally, where they are sustained by the force of gravity. In laboratories, researchers use strong magnetic fields to confine plasma. Magnetic confinement technique allows to confine them to maintain the characteristics necessary for fusion grade plasmas for a sufficient period of time. Another confinement strategy is to make use of the inertia of imploding matter. Inertial confinement is an active research area. Laboratories also use high power lasers to compress hydrogen fuel to very high densities for very short durations. In our country, Aditya (synonym of sun in Hindi) is the first indigenously designed and fabricated tokamak. It is located at the campus of IPR in Gujarat and has operated since 1989. It is a medium sized tokamak, capable of conducting experiments with high plasma current at high temperatures. With timely modification, it contributes experimental results to the international database. In 2020, on 27-28 January, a two-day national symposium was organised to commemorate the first 30 years of the successful operation of the first indigenous tokamak in India-Aditya and its upgrade Aditya-U. (For further information see (www. Ipr.res.in/Aditya30years/index.html).

A nuclear fusion process liberates energy when the mass of the reactant nuclei exceeds that of the reaction products. This is maximum for the fusion of the lightest elements and hence much more energy is liberated by fusion of hydrogen isotopes such as deuterium and tritium. The basic equation made use of in nuclear fusion is $E=mc^2$, deduced by Albert Einstein from his special theory of relativity. It is a statement of the equivalence of

energy and mass and asserts that mass can be completely converted to energy. This equation is used to calculate the amount of energy that could be generated from nuclear fission, fusion and other reactions between nuclei.

The most important fusion reactions with relatively high chance for fusion and release of significant amount of energy are as given below.

Reactants	**Products**
D-D (Deuteron-Dueteron)	T (Triton) + p (proton)
D-D	^{3}He + n (neutron)
D-T	^{4}He + n
D- ^{3}He	^{4}He + p

D-T reaction is important because of its relatively favourable cross section (chance) . D-T reactors would operate at a temperature close to 10 keV. [In plasma physics temperature is referred to by their equivalent energies, expressed in electron volts (eV), (which corresponds to the energy gained by an electron when it is accelerated through a potential difference of 1 volt, and it is equal to 1.6×10−19 joules) or kilo-electron volts (keV) etc. Also, the product of the Boltzmann constant k (in 1.380649×10^{-23} joule per kelvin) and temperature T in Kelvin is energy in Joules. The conversion factor is 1 eV corresponds to 11606-degree Kelvin (K) and one keV corresponds to 11.6 million degrees Kelvin]. At this temperature, in stars like sun, hydrogen atoms live for a million years before they fuse into helium to release energy. Our attempt is to make our own miniature sun on earth. As we cannot wait for a million years, we must increase the temperature to speed up the process. We can also increase the inertia in a head-on collision with heavier hydrogen isotopes, ie. deuterium and tritium. The inertia is for overcoming the Coulomb repulsion.

Lawson's criteria for nuclear fusion

This was developed by John D. Lawson in 1955. The Lawson criteria gives the minimum required value for the product of the plasma (electron) density n_e and the energy confinement time τ_E that needs for net energy output. Later it was observed that a more useful figure of merit is the triple product of density, confinement time and plasma temperature T. The triple product also has a minimum required value and nowadays the Lawson criterion refer to this value (i.e. the product of the fuel density n,

energy confinement time τ_E and fuel temperature T).

International scenario

Modern plasma physics research has its beginning around 1952 and individual research works were going on in different nations. In 1958, a significant conference was held in Geneva, at which each participating nation revealed the status of their independent attempts towards controlled nuclear fusion. Independent research was continued by each country until 2007, when ITER (International Thermonuclear Experimental Reactor) project was started in France and initially it was funded by seven nations (China, the European Union, India, Japan, Korea, Russia and the United States). They will share the cost of project construction, operation and decommissioning, and also share in the experimental results and any intellectual property generated by the project. Twenty years of collaborative research experiments are planned on the machine. Also note that, coincidentally, ITER is a Latin word, meaning path or road. This project is actually a road that mankind takes to solve the problems of global warming and oil shortage which are the negative side effects coming up in our attempts to produce energy.

Of the different presentations at Geneva, the USSR's tokamak had been selected as the leading idea and was considered as the configuration for ITER. A tokamak is a toroidal device for producing controlled nuclear fusion that involves the confining and heating of a gaseous plasma by means of an electric current and magnetic field. In other words, a tokamak is an experimental machine designed to harness the energy of fusion. The energy produced through the fusion of atoms in the plasma is absorbed as heat in the walls of the vessel. Just as in a conventional power plant, a fusion power plant will use this heat to produce steam and then electricity by way of turbines and generators. The ITER members test here their instruments developed.

In a very recent post, the Chinese Academy of Sciences reported that on Monday, 20th January, 2025, the Experimental Advanced Superconducting Tokamak (EAST), commonly known as 'China's artificial sun' had achieved a scientific milestone by maintaining steady-state high confinement plasma operation for 1066 seconds, using hydrogen and deuerium as fuel. This is a new world record and marks a significant breakthrough in the pursuit of fusion power generation. (https://phys.org/news/2025-01-chinese-artificial-sun-fusion-power.html).

Thus, our ultimate aim is to participate in a race to build a mini-sun on earth. In this race, for young and enthusiastic researchers, fusion research offers plenty of opportunities to collaborate and contribute to the development, both nationally and internationally.

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The Indian Space Programme: Exploring New Frontiers

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The Indian space programme has a relatively short history compared to that of many of the developed nations. Yet, the achievements of the Indian space programme are comparable in many respects with those of advanced countries. The last six decades of Indian Space Research Organisation's (ISRO's) efforts have led to self-reliance in advanced technologies for building spacecraft for various applications, launch systems for accessing space and application programmes benefiting the society at large. The constellation of Indian National Satellite (INSAT) system for communication, TV broadcasting and meteorology, and the Indian Remote Sensing (IRS) satellite system for earth observations as well as the operational launch vehicles like Polar Satellite Launch Vehicle (PSLV), Geostationary Launch Vehicle (GSLV) are all testimony to this.

During the period, many institutions of excellence have been set up to carry out research and development at the cutting edge of technology related to space. The fact that Indian technology has been marketed globally in the form of IRS images, launch services and many sub-systems, assemblies for space crafts, show the maturity and competitiveness of ISRO. The entire space activities in the country have been in a cost-effective manner and the reliability of the space systems has been proven through a number of missions.

While pursuing the technology development, ISRO has taken initiatives in space science research as well. Many missions for studying stellar systems and galactic phenomena were implemented in the past and the future missions like Chandrayaan-4 to the Moon, Gaganyaan and the Bharatiya Antariksh Station (BAS) are examples of ISRO's continued commitment to space sciences. International cooperation is a key ingredient of the Indian space programme. ISRO pursues a number of space research activities in collaboration with the space agencies of many countries like ROSCOSMOS of Russia, NASA of the USA, ESA of Europe, CNES of France, JAXA of Japan,

ASI of Italy, AEB of Brazil etc.

2023: A Golden Year for ISRO

For the ISRO, 2023 marked an extraordinarily glorious year with 11 successful missions in a row. The missions in 2023 were varied and established ISRO's versatility in building launch vehicles and using them to put its own satellites in orbit. The rockets used included the Small Satellite Launch Vehicle (SSLV), the PSLV, the GSLV, the Launch Vehicle Mark 3 or LVM3, the Reusable Launch Vehicle (RLV), and Test Vehicle (TV) to prove the Crew Escape System as a part of the Gaganyaan mission slated for 2025. The satellites that went into orbit included Earth Observation Satellites; Aditya-L1, the spacecraft to study the Sun; a satellite to predict weather, and, of course, the Chandrayaan-3 to the Moon.

The year began with the lift-off of the Small Satellite Launch Vehicle (SSLV) from Sriharikota on February 10. It was the second developmental launch of the SSLV. On March 26, LVM3-M3, India's most powerful launcher rose from the launchpad at Sriharikota and injected 36 OneWeb communication satellites into a circular, Low-Earth Orbit (LEO). Each satellite weighed 150 kg, totaling 5,796 kg. It was a commercial launch – one of the biggest commercial orders executed by ISRO. The RLV-LEX-01, short for the Reusable Launch Vehicle - Landing Experiment One – took place on April 2 at the Aeronautical Test Range (ATR) near Chitradurga in Karnataka. It was the first landing experiment of the RLV, a winged plane, named 'Pushpak', on a runway. The RLV was released from an Indian Air Force Chinook helicopter from an altitude of 4.5 km and range of 4.5 km away from the runway. The RLV came and landed precisely on the runway at a velocity of 99 metres per second.

On April 22, PSLV-C55 rose from Sriharikota and put two communication satellites from Singapore into orbit. It was a dedicated commercial mission for NewSpace India Limited, a commercial arm of the Department of Space. The GSLV-F12 on May 29 put India's own navigation satellite into orbit. The satellite forms part of Navigation with Indian Constellation (NavIC) services. On July 14, the LVM3-M4 blasted off from the launchpad and put the Chandrayaan-3 ensemble into its initial orbit signaling the beginning of its 3.84-lakh kilometre journey towards the Moon. It comprised a Propulsion Module. On top of it stood the lander Vikram with the rover Pragyan (a six-wheeled robotic vehicle) inside it.

There were more missions. The PSLV-C56 DS-SAR mission took place on July 30. The vehicle put the primary Earth observation satellite, DS-SAR, with radar imaging capability, and six other co-passenger satellites into precise orbit. All the satellites were from Singapore. It was a commercial launch. The PSLV-C57 put the spacecraft Aditya-L1 into orbit on September 2. It was India's first space-based observatory to study the Sun. The TV-D1 (Test Vehicle-Demonstration 1) mission, a forerunner to the Gaganyaan mission in 2025, took place on October 31, 2023. It entailed bringing back an unmanned crew module safely to the Earth after launching it on a small rocket and simulating an emergency abort command. The efficacy of the crew escape system in an emergency which is a vital system in the Gaganyaan flight, was demonstrated successfully.

The outstanding year drew to a close with "a special launch of a sounding rocket" on November 21 from Thumba to celebrate 60 years of the launch of the Nike-Apache rocket, which had signalled the beginning of India's space programme. Dr. S. Unnikrishnan Nair, Director, Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram, likened the string of different successful missions in 2023 to "a pearl necklace with different coloured pearls".

Chandrayaan-3: India on the Moon

The crowning achievement was Chandrayaan-3's lander Vikram soft-landing on the Moon at 6.03 p.m. on August 23, 2023. Vikram performed a ballet as it were, twirling around when it descended towards the Moon's surface and finally anchored itself firmly with its four legs on the lunar soil near the South Pole. Six hours later, rover Pragyan emerged from the lander, rolled down a ramp on its six wheels, and drove about on the lunar soil. In the succeeding 12 days or so, Pragyan would move about 100 metres in the surrounding areas of the landing spot and conduct *in situ* exploration of the lunar surface, while Vikram would do the same as it firmly anchored itself over the Moon's surface. Four payloads on Vikram and two on Pragyan were part of this exploratory work. Science in Chandrayaan-3 was not confined to Vikran and Pragyan only. The third component of Chandrayan-3 – Propulsion Module – effortlessly orbited the Moon. Equipped with its Spectro-polarimetry of HAbitable Planet Earth (SHAPE) payload, it focused its attention on the Earth by monitoring the spectrum of radiation coming from the Earth as well as its extent of polarization. This was to understand the characteristic of

the Earth as a habitable planet through the study of near infrared rays it reflects. The Project Director of the Chandrayaan-3 lunar mission was Dr. P. Veeramuthuvel.

The success of Chandrayaan-3 Mission established India as the fourth country, after the erstwhile Soviet Union, the USA and China, to master lunar soft-landing technology and the first to land near the lunar south pole. Recognising the stellar achievement of Chandrayaan-3, Hon'ble Prime Minister of India has named the landing site of Chandrayaan-3 lander Vikram as Shiv Shakti point and has declared August 23 as National Space Day in India.

Aditya-L1: Questing for the Suns' Mysteries

After the grand success of Chandrayaan-3, the ISRO on September 2, 2023, launched Aditya-L1, a space observatory-class spacecraft dedicated to studying the Sun and its effects on the solar system. Aditya is another name of Surya, the Sun God in the Hindu pantheon. The suffix 'L1' signified the First Lagrange Point in the Earth-Sun system, the location from which Aditya-L1 would continuously observe the Sun 24 hours a day for an extended period. (Lagrange point – a point in space where the Earth's and the Suns's combined gravitational force acting on the spacecraft exactly balances the centrifugal force felt by the spacecraft). Aditya-L1 carried seven payloads to study the Sun's photosphere, chromosphere, and corona. On January 6, 2024 the spacecraft entered into a 'halo orbit' around L1 Lagrange Point and began settling down in that special orbit. It will be active for a minimum duration of about five years and may provide valuable insights into the activities of the Sun. A deep knowledge of such activities in turn might enable the generation of timely forewarning of the dangers resulting from the Sun's periodic wrath (solar flares, coronal mass ejections and solar radio bursts) that have a profound influence on the orderly functioning of our modern world, overwhelmingly dependent on electric and electronic gadgets including computers and satellites. The Project Director of Aditya-L1, India's maiden solar mission, was Smt. Nigar Shaji.

XPoSat: Space Observatory to Study Cosmic X-rays

On January 1, 2024, the Polar Satellite Launch Vehicle (PSLV-C58) put the XPoSat (X-ray Polarimeter Satellite) into orbit. XPoSat is ISRO's first scientific satellite dedicated to studying cosmic X-ray sources. It analyses

the polarisation of X-ray emissions from celestial objects such as neutron stars and black holes. The satellite's POLIX (Polarimeter Instrument in X-rays) payload on board, observes medium-energy X-rays, while the XSPECT (X-ray Spectroscopy and Timing) payload studies the spectral and temporal characteristics of soft X-ray sources. Over its five-year mission, XPoSat aims to enhance our understanding of the universe by observing about forty bright celestial objects. This mission marks a significant advancement in X-ray astronomy and polarimetry for ISRO. The Mission Director of XPoSat mission was Dr. M. Jayakumar.

SpaDeX mission: Docking in Space

The aim of the SpaDeX mission of the ISRO was to autonomously dock two 220-kg unmanned crafts in space – SDX01, the chaser and SDX02, the target. Docking is a crucial procedure to facilitate transfer of astronauts and equipment to and from space stations. As part of the mission, ISRO's PSLV-C60 launcher on December 30, 2024, released the two spacecrafts into a 470-km circular orbit at a 55-degree incline to the equator with a marginal relative velocity between the two. This was to enable the chaser SDX01 to close in to the target SDX02, and attach itself to the latter to achieve a successful docking. The space docking was successfully achieved on 16 January 2025. Post docking, electrical power transfer between the two space crafts would be demonstrated before they are separated to begin working with their respective payloads for an expected mission life of up to two years. The SpaDeX mission is linked to the plan for setting up India's own space station, named the Bharatiya Antariksh Station by 2035. The Project Director of PSLV-C60/SpaDeX mission is Shri. N. Surendran.

Gaganyaan Mission: India's Human Space Flight Programme

The Gaganyaan mission undertaken by ISRO is to demonstrate indigenous human spaceflight capability in India's space programme. The mission aims at sending a crew of up to 2 Indian astronauts to a 400 km Low-Earth Orbit (LEO) for up to three days and safe landing on Indian waters. Upon successful completion, India will become the fourth country in the world to possess end to end capability of human space flight mission. This will be followed by medium- and long-term missions to demonstrate long duration crewed habitation in LEO and beyond.

The configuration of Gaganyaan consists of three major components *viz*. Human-rated Launch Vehicle (HLV), Crew Escape System (CES) and Orbital

Module (OM). Orbital Module is a composite module of Crew Module (CM) and Service Module (SM) which are docked to each other. The Gaganyaan mission is configured such that Orbital Module is assembled inside the Crew Escape System which in turn is assembled to HLVM3 as a payload in the usual configuration of any other missions. HLVM3 is Human-rated version of ISRO's Launch Vehicle Mark-III (LVM3) and it will be used for injecting orbital module into the designated orbit. Crew Escape System (CES) is basically a quick-acting solid propulsion system designed to eject the crew module - which carries the astronauts - from the launch vehicle, take it to a safe altitude and bring it back safely to the earth in the event of launch exigencies.

Crew selection and training are yet another critical facet of human space flight missions. Four astronauts for the Gaganyaan mission (Gaganyatris) have been selected from a pool of qualified test pilots from the Indian Air Force. They are Group Captains Prasanth Balakrishnan Nair, Ajit Krishnan and Angad Pratap, and Wing Commander Shubanshu Shukla. Post their selection, the four Gaganyatris have completed their generic spaceflight training in Gagarin Cosmonaut Training Centre (GCTC), in the Star City near Moscow, Russia. Two Gaganyatris are also undergoing training at NASA under joint ISRO-NASA-Axiom Space mission to International Space Station (ISS). The plan is to send one of the astronauts (Group Captain Shubanshu Shukla) to the ISS using an American rocket *viz*. SpaceX's Dragon spacecraft.

A half-humanoid robot with a feminine appearance named Vyommitra is expected to be on board the first uncrewed Gaganyaan mission (G1). Vyommitra is designed to stimulate human functions in space and interact with the life support system for astronauts. Following the successful test flights of uncrewed missions (G1, G2, G3) in 2025, the first human space flight mission of Gaganyaan (H1) is planned by 2026. The success of the first crewed mission of Gaganyaan programme (H1) will indeed herald a new era of sustained human space programme in space.

The benefits of human space flight programme to the country are manifold including scientific, technological and economic benefits, among others. It provides a direct platform for astronauts to conduct various microgravity experiments in the fields of biomanufacturing, regenerative medicine, bioengineering in space, pharmaceutical development etc. which otherwise are not possible with conventional satellites. Investment

towards space systems for human space missions contributes in increasing the size of the Indian Space Economy.

Bharatiya Antariksh Station (BAS): India's Space Station

To achieve the vision of continued human presence in space, it is imperative to establish an Indian space station, namely Bharatiya Antariksh Station (BAS), in LEO like any other space stations, past or present, to cater to prolonged stay of crew in space. The BAS when in orbit will be the first national space laboratory to conduct multidisciplinary microgravity experiments and studies in the fields of science, technology, medicine and agriculture among others. BAS will also be acting as a platform for global and national collaboration, gateway for lunar exploration and beyond, and to help boosting the space economy of the country by undertaking LEO orbit economy activities including space tourism and space refuelling activities. The first module of BAS will be launched by 2028 and the full-fledged station by 2035. Post 2035, the station is envisaged to be made operational and is expected in orbit for a minimum of 15 years.

Bharatiya Antariksh Station (BAS) consists of five modules called BAS-1, BAS-2, BAS-3, BAS-4 and BAS-5 modules. The estimated mass and power of full 5-moduled BAS station in orbit are approximately 52 tons and 26 kW respectively. It has an overall span of 27 m x 20 m. Launch Vehicle Mark 3 (LVM3), the operational heavy lift launch vehicle of ISRO, is considered to be the prime launch vehicle for launching BAS modules. The modules are configured such that habitable volume, solar panel accommodation and Micrometeoroids Orbital Debris (MMOD) shields are optimized to fit inside the LVM3 payload fairing. BAS can support a crew of 3 to 4 members for long duration of crew habitation of the station. However, it can support up to 6 crew for short duration mission.

While conventional space systems are tailored towards maximizing payload launched to orbit, crew safety is the major driver for crewed mission like Gaganyaan and BAS. This is ensured though risk identification, implementing necessary risk mitigation strategies as per human rating standards and guidelines, and extensive validation through test programme. The critical subsystems where crew safety is concerned include human rating of systems, Environmental Control and Life Support Systems (ECLSS), protection systems, robotic systems, crew selection and training among others. Human spaceflight missions also require complex mission operations and continuous communication between flight crew

and mission control centre for crew safety and situational awareness. A network of ground stations of ISRO/international agencies, ship-borne terminals and satellite-based communication *via* India Data Relay Satellite Systems (IDRSS) is being planned.

Chandrayaan-4 and Venus Orbiter Mission (VOM): New Missions of ISRO

The Union Cabinet has recently approved two key space missions – another mission to the Moon called Chandrayaan-4 and a mission to Venus to study and explore the planet. Chandrayaan-4 would develop and demonstrate the technology to return to Earth after successfully landing on the Moon and will also collect lunar samples and analyse them on Earth. It is one of a series of missions that the ISRO is proposing to do before landing a man on the Moon by 2040. The Venus Orbiter Mission (VOM) or Shukrayaan by March 2028 will be a significant step towards the government's vision of exploring and studying Venus, beyond the Moon and Mars.

A new satellite named NISAR (NASA-ISRO Synthetic Aperture Radar) satellite is set to be launched in March 2025. The mission is a joint project between NASA and ISRO to co-develop and launch a dual-frequency synthetic aperture radar on an Earth observation satellite. It will be the first radar imaging satellite to use dual frequencies (L-band and S-band), and will be used for remote sensing, to observe and understand natural processes on the Earth. An independent regional navigation satellite system named "NavIC" (Navigation with Indian Constellation) is also being developed by India. It is designed to provide accurate position information service (similar to GPS) to users in India as well as the region extending up to 1500 km from its boundary. Another proposed project is the development of a new rocket called the NGLV (New Generation Launch Vehicle).

The ISRO has already started the work for setting up a second spaceport for launching Small Satellite Launch Vehicles (SSLVs) at Kulasekarapattinam in Tuticorin district of Tamil Nadu. ISRO's first space port *viz*. the Satish Dhawan Space Centre (SDSC), located at Sriharikota in Andhra Pradesh, will be used for launching the Polar Satellite Launch Vehicles (PSLVs) and the massive Geostationary Satellite Launch Vehicles (GSLV-Mk II and III).

Epilogue

Till as late as 2003, India did not have a planetary science programme. Barely 21 years later, India has successfully landed or deployed multiple

rovers and orbiters on the Moon and Mars. The journey of the Indian Space Research Organisation (ISRO) has been truly spectacular. The Indian space programme today is a vibrant, self-reliant and user-driven enterprise providing uninterrupted operational services in areas crucial to national development. Deriving its sustenance from indigenous industry, academic community and international cooperation, the space programme stands out as one of the most visible symbols of the resurgent, modern India.

India's space programme was never short of global praise, but too often the focus was on the cost-effectiveness of its missions and not enough on its technological advancements. However, the Chandrayaan missions have changed this familiar theme. The achievements of Chandrayaan-3 made the world sit up and take notice, and recognize India as an advanced space-faring nation that adds to the world's understanding of outer space, and not just as a developing country that launches satellites at a fraction of the cost in the developed West.

India's space ambitions now seem limitless, and the Indian space programme is now taking a giant leap towards achieving indigenous capability in launching of humans to space initially though the Gaganyaan mission, which will be further solidified with the eventual establishment of Bharatiya Antariksh Station (BAS). The BAS is poised to serve as a platform for sustained human presence in space, carrying out complex microgravity experiments, and generating LEO economy including space tourism, in-orbit services and refuelling, which are otherwise not possible with the conventional satellite missions. These missions represent crucial building blocks of India's Space Vision 2047, a long-term strategy aimed at establishing the country as a major space power by its 100th year of independence.

> "If we are to play a meaningful role nationally and in the community of nations, we must be second to none in the application of advanced technologies to the real problems of man and society." Dr. Vikram A. Sarabhai

The Impact of Nanotechnology Research on the Future Economy of India

Dr. Sunny Kuriakose
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Introduction

NANOTECHNOLOGY, the science and engineering of materials at the atomic and molecular level, has become a promising field that has the power to completely alter economies and industries on a global scale. As a developing economy with a vast market and growing technological capabilities, India is uniquely positioned to harness nanotechnology for economic growth and societal benefits. Research and development (R&D) expenditures in nanotechnology are expected to be crucial in determining the direction of India's economy in the future as it looks to solidify its status as a major economic force in the world. The use of nanotechnology in manufacturing, healthcare, energy, and agriculture provides India with a route to sustainable growth, increased competitiveness, and a better standard of living for its people. The Government of India launched the Nano Mission in 2007 as an umbrella capacity-building programme. As a result of the efforts led by the Nano Mission, today, India is amongst the top five nations in the world in terms of scientific publications in nanoscience and technology.

Nanotechnology: A Global Economic Driver

The world's leading economies, including the United States, China, and Germany, have established strong nanotechnology ecosystems that integrate academic research, industrial applications, and government policy. India, with its expanding population and industrial base, stands to benefit greatly from this technological wave. However, in order to fully realise the potential of nanotechnology, India must address important challenges, such as inadequate funding, limited infrastructure, and a fragmented innovation ecosystem. The global nanotechnology market was valued at approximately $2 billion in 2022 and is expected to grow exponentially due to advancements in material science, electronics, and biotechnology.

Nanotechnology can significantly contribute to India's GDP by driving innovation, creating new markets, and enhancing industrial competitiveness. Sectors such as healthcare, agriculture, and energy are expected to witness increased productivity and cost savings, leading to

higher incomes and job creation. Additionally, as a hub for affordable nanotechnology solutions, India can attract foreign investments and boost exports, improving its trade balance.

Economic Sectors Poised for Transformation

1. Healthcare and Pharmaceuticals

Nanomedicine, an interdisciplinary field combining nanotechnology and medicine, has gained immense attention in recent years due to its potential in revolutionizing healthcare. India, being an emerging hub for scientific research and development, has made significant strides in nanomedicine research. Nanotechnology has transformative potential in healthcare, particularly in diagnostics, drug delivery, and regenerative medicine. The development of nanoscale drug delivery systems enables targeted treatment of diseases such as cancer, minimizing side effects and improving efficacy. India, as a leading global producer of generic medicines, can leverage nanotechnology to create high-value pharmaceutical products, thus enhancing export revenue and reducing healthcare costs domestically.

2. Energy and Environment

India's growing energy demands and environmental concerns necessitate the adoption of sustainable technologies. Nanotechnology plays a critical role in developing renewable energy solutions, such as high-efficiency solar cells, lightweight and high-capacity batteries, and advanced fuel cells. Nanomaterials like graphene and quantum dots have the potential to revolutionize energy storage and conversion, making renewable energy more affordable and accessible.

In environmental management, nanotechnology can address pollution and resource scarcity. For example, nanomaterials can be used in water purification systems to remove contaminants like heavy metals and pathogens. Similarly, air pollution control technologies employing nanoscale catalysts can mitigate industrial emissions. These innovations align with India's commitment to sustainable development and can attract investment in green technologies, fostering economic growth.

3. Agriculture and Food Security

Agriculture is a cornerstone of India's economy, employing nearly half of the workforce. However, the sector faces challenges such as declining soil fertility, water scarcity, and climate change. Nanotechnology offers solutions through the development of nanofertilizers, nanopesticides, and nanosensors for precision farming. Nanofertilizers ensure the efficient delivery of nutrients, minimizing environmental damage and costs, while nanosensors can monitor soil health and crop conditions in real-time.

Moreover, nanotechnology can improve food preservation and packaging. Nano-enabled antimicrobial coatings and smart packaging that indicates food spoilage can reduce post-harvest losses, which are a significant issue in India. By addressing these challenges, nanotechnology can enhance agricultural productivity, food security, and rural incomes, contributing to inclusive economic growth.

4. Manufacturing and Industry 4.0

Future Indian industry relies heavily on nanotechnology, which makes it possible to create sophisticated materials with desirable qualities like strength, conductivity, and heat resistance. High-performance, lightweight, and energy-efficient products can be made with these materials in the electronics, automotive, and aerospace sectors. Under the "Make in India" campaign, India hopes to become a global centre for manufacturing, and nanotechnology can boost industrial growth and competitiveness.

5. Electronics and Information Technology

India's burgeoning electronics and IT sectors stand to benefit immensely from nanotechnology. The miniaturization of electronic components enabled by nanotechnology can lead to faster, more energy-efficient, and compact devices. Innovations such as flexible electronics and wearable technologies have applications across industries, including healthcare, entertainment, and defence.

Additionally, India's emphasis on semiconductor manufacturing under initiatives like "Make in India" can be bolstered by nanotechnology research. Advanced nanofabrication techniques can reduce production costs and enhance the competitiveness of Indian electronics in global markets. This sector's growth can generate employment opportunities and drive exports, strengthening India's economic position.

Government Initiatives and Policy Framework

The Indian government has taken a number of steps to encourage research and development as well as innovation in the field of nanotechnology, acknowledging its strategic significance. A key initiative since its inception in 2007 is the "Nano Mission," which offers funds for infrastructure development, research projects, and training of human resources. In order to close the gap between research and commercialisation, partnerships between government organisations, industry, and academia are also being promoted. Despite these initiatives, India still spends less on nanotechnology research and development than the world's top nations. To spur innovation and draw in private sector investment, funding must be increased and regulatory procedures must be streamlined.

Challenges and Recommendations

1. Funding and Investment

As mentioned above, India's current investment in nanotechnology R&D is insufficient to compete with global leaders. The government must allocate higher budgets to nanotechnology research and provide incentives for private sector participation. Public-private partnerships (PPPs) can play a critical role in bridging the funding gap.

2. Skill Development and Education

A trained labour force is essential for the development of nanotechnology. In order to promote innovation, India has to improve its nanoscience and technology education programs by using interdisciplinary techniques. India's skills can be further improved by establishing centres of excellence and encouraging international cooperation.

3. Infrastructure and Commercialization

State-of-the-art infrastructure, including nanofabrication facilities and testing laboratories, is essential for cutting-edge research and product development. Additionally, fostering a robust ecosystem for technology transfer and commercialization can help translate research into marketable products.

4. Ethics and Regulation

As part of the ethics and regulations, concerns regarding toxicity, bioaccumulations and long-term environmental impact must be addressed. Ethical responsibility includes conducting comprehensive risk analysis and assessment before commercialization, especially in the field of diagnosis and pharmacological applications. All kinds of precautionary principles should be adopted, ensuring that nanotechnology benefits all socio-economic classes. Moreover, the laws and regulations should focus on making nanotechnology-driven scientific benefits affordable to the poor and the marginalized.

Conclusion

Nanotechnology research holds immense promise for transforming India's economy, driving innovation, and addressing critical societal challenges. By strategically investing in this field and fostering a supportive ecosystem, India can position itself as a global leader in nanotechnology. The integration of nanotechnology across key sectors such as healthcare, energy, agriculture, and manufacturing will not only enhance economic growth but also improve the quality of life for millions of Indians. With a concerted effort from policymakers, researchers, and industry stakeholders, nanotechnology can become a cornerstone of India's future economy, propelling the nation toward sustainable and inclusive development.

Generative AI: Revolutionizing Creativity and Innovation

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Introduction

Generative Artificial Intelligence (Generative AI) is a revolutionary branch of AI that empowers machines to create content, including text, images, music, and videos, resembling human creativity. Unlike traditional AI, which primarily analyses and processes existing data, Generative AI generates entirely new content based on learned patterns. This technology has gained significant traction in recent years, reshaping industries such as entertainment, healthcare, finance, and education.

Advancements in deep learning, particularly through Generative Adversarial Networks (GANs) and transformer-based models like GPT (Generative Pre-trained Transformer), have elevated AI-generated content to new levels of sophistication. Tools like ChatGPT produce human-like text conversations, while DALL-E generates realistic images from textual descriptions. As Generative AI continues to evolve, it is unlocking new possibilities for automation, innovation, and creativity, making it an essential technology in today's digital landscape.

History of Generative AI

The roots of Generative AI trace back to early machine learning experiments in the mid-20th century. Alan Turing's work on machine intelligence in the 1950s laid the foundation for AI-driven creativity. However, it wasn't until the advent of neural networks and deep learning that Generative AI truly began to take shape.

In 2014, Ian Goodfellow and his team introduced Generative Adversarial Networks (GANs), a pivotal innovation that enabled AI to generate realistic images by training two neural networks against each other. This breakthrough led to significant developments in AI-generated art, deep fake technology, and automated content production.

The rise of transformer-based architectures, particularly OpenAI's GPT series and Google's BERT (Bidirectional Encoder Representations from Transformers), further accelerated Generative AI's capabilities. These models revolutionized natural language processing (NLP), allowing AI to produce coherent and contextually relevant text, transforming applications like chatbots, virtual assistants, and automated writing tools.

Generative AI and Large Language Models (LLMs)

Generative AI relies on Large Language Models (LLMs), which are trained on extensive datasets to generate human-like text and facilitate advanced language processing. These models, such as OpenAI's ChatGPT, Microsoft's Copilot, Google's Gemini 2, and Meta's Llama2, have revolutionized various applications by enabling AI-driven interactions and automation. LLMs excel in text generation, producing original content based on prompts, and in text completion by predicting logical sentence continuations. Additionally, they enhance question-answering systems by retrieving precise information and contribute to summarization by condensing lengthy texts while preserving essential details. Their translation capabilities allow for seamless language conversion, while conversational AI models engage users in human-like dialogues. Furthermore, LLMs support sentiment analysis, helping businesses understand emotional tones in user feedback, and named entity recognition, which identifies crucial details like names, locations, and organizations. As a result, LLMs play a vital role in improving communication, productivity, and decision-making across various industries.

How Do LLMs Work?

Large Language Models (LLMs) like ChatGPT operate using a combination of advanced AI technologies that enable them to understand and generate human-like text. At the core of these models are Artificial Neural Networks (ANNs), which simulate human brain functions to process vast amounts of data efficiently. Natural Language Processing (NLP) further enhances their ability to interpret and analyze text, ensuring contextual accuracy. A crucial component of LLMs is the Transformer Architecture, a neural network design that enables parallel text processing, making responses more coherent and relevant. These models are built on Generative Pre-trained Transformers (GPT), which are trained on extensive datasets to recognize linguistic patterns and generate fluent text. Transfer Learning allows LLMs to apply knowledge from one domain to another, improving adaptability across different topics. Additionally, Reinforcement Learning helps refine AI responses through user interactions and feedback, ensuring continuous improvements in performance. Lastly, the Attention Mechanism plays a pivotal role by enabling the model to focus on the most relevant parts of input data, resulting in more accurate and contextually appropriate responses. These combined technologies make LLMs highly effective in understanding and generating text across a wide range of applications.

Types of Generative AI Models

Generative AI encompasses various models, each designed to perform specific tasks across different data modalities. Text-to-Text models, such as ChatGPT and Bard, generate meaningful and coherent text based on input prompts, making them valuable for content creation, summarization, and

conversational AI. Text-to-Image models, like DALL-E 2, transform textual descriptions into visually realistic images, aiding designers, artists, and marketers. Image-to-Image models modify or enhance existing images, enabling tasks such as style transfer, resolution enhancement, and artistic transformations. Similarly, Image-to-Text models analyze images and generate descriptive captions, improving accessibility for visually impaired users. Speech-to-Text models transcribe spoken language into written text, facilitating real-time transcription, subtitling, and voice-command applications. Text-to-Audio models generate sound, music, or narrated content based on textual input, creating immersive auditory experiences. Text-to-Video models synthesize video content from text descriptions, streamlining the process of video production and animation. Lastly, Multimodal AI models integrate multiple input types, such as text, images, and audio, to enhance user interactions and learning experiences, making AI more versatile and dynamic across industries. These diverse generative AI models continue to revolutionize content creation, communication, and digital innovation.

Future of Generative AI

The future of Generative AI looks promising, with ongoing developments focusing on enhancing ethical AI usage and expanding its integration into emerging technologies. AI Regulation and Ethics will play a crucial role in ensuring transparency, fairness, and accountability in AI-generated content. With growing concerns about bias, misinformation, and intellectual property, regulatory frameworks will help establish ethical guidelines and prevent misuse.

Additionally, Integration with Augmented Reality (AR) and Virtual Reality (VR) will enhance immersive experiences, allowing AI to generate interactive, real-time environments for gaming, education, and virtual collaboration. The entertainment industry will also see transformation with AI-Generated Films and Music, where AI will assist in scriptwriting, music composition, and automated video production, reshaping creative workflows.

Moreover, Automated Scientific Research will benefit from generative AI's ability to analyze vast datasets, generate hypotheses, and accelerate discoveries in medicine, chemistry, and physics. The responsible development of Generative AI will be key to maximizing its benefits while ensuring fairness, security, and positive societal impact.

As AI continues to evolve, its integration into our daily lives will become more profound, unlocking endless possibilities for innovation and creativity. Generative AI is not just a technological advancement—it is a transformative force shaping the future of digital interaction, business, and creativity.

LPG of India's Higher Education: Prospects and Challenges

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Student mobility and global exchanges are not something new to India. As early as seventh century BC, *Takshacila* attracted more than 10,500 students from all over the world who studied in more than 60 subjects at this university. The University of *Nalanda,* built in the fourth century BC, and considered to be one of the of the great achievements of the ancient period in the field of education, attracted scholars and students from various parts of the globe. At the time of independence there were just around 20 universities and 500 colleges. Today, the Indian higher education system is a large and complex body with a variety of institutional structures and regulatory bodies. After the Economic Liberalisation in 1991, the Indian higher education landscape has been undergoing a profound transformation. Accreditation and co-ordination are overseen by the University Grants Commission (UGC), established under the University Grants Commission Act of 1956 keeping in view the objectives of the National Education Policy (1986-92). The National Institutional Ranking Framework and the National Board of Accreditation (NBA) have played pivotal roles in ensuring that Indian institutions meet international standards. Autonomous colleges (1222 colleges in 2024) in India have been gaining prominence in the educational landscape, offering students a unique learning experience outside the traditional university structure.

India has the third largest higher education system in the world in terms of enrolments, after China and the USA (World Bank Report, 2019). The All-India Survey of Higher Education (AISHE), 2021-22 provides statistics about a total of 1,168 Universities/University level Institutions. Total enrolment in higher education increased to nearly 4.33 cr. in 2021-22. The Economic Survey 2024-25 reveals India's higher education system has grown significantly, with institutions increasing by 13.8% and the Gross Enrolment Ratio (GER) rising from 23.7% to 28.4% between 2014-15 and 2021-22. It is, as of now, estimated to grow at a rate of 10.7%. The growth is expected to hit an impressive US$ 125.8 billion by 2032. India's education market is likely to add up to US$ 225 billion by FY25. FDI equity inflow in the education sector from April 2000-March 2024 stood at US$ 9.51 billion. In the QS World University Rankings: Asia 2025 India stands out with two universities in the top 50 and seven in the top 100, led by the

IIT Delhi with 44th place.

In a country like India, where the population between 5 and 24 years of age is well over 500 million, the potential of the higher education sector is limitless. The Government of India has taken initiatives like National Accreditation Regulatory Authority Bill for Higher Educational and the Foreign Educational Institutions Bill and allowed 100% FDI in the education sector of India. The government has implemented policies like the NEP 2020 that marks an ambitious effort to address persistent issues and reform the higher education landscape in India. With a target of achieving a 50% Gross Enrolment Ratio (GER) by 2035, the policy aims to dramatically increase access while also enhancing educational quality and outcomes, but the implementation of the reform of policy will require sustained effort and investment. The current GER of 27.3% highlights the considerable gap that needs to be bridged.

LPG of Indian Higher Education: Prospects and Trends

Globalization has ushered in numerous opportunities for higher education institutions in India. The global landscape has facilitated collaborations for Indian higher education institutions and led to innovative research ventures, joint degree programs, and various initiatives. One of the most evident trends in Indian higher education is the significant rise in international student enrolment. According to AISHE: 2021-22, the total number of foreign students enrolled in higher education is 46,878. The foreign students have come from 170 different countries. In 2021-22, the highest share of foreign students is from Nepal (28%), followed by Afghanistan (6.7%), United States (6.2%). Top 10 countries constitute 64.7% of the total foreign students. This influx can be attributed to the growing reputation of Indian institutions, lower tuition fees compared to Western countries, and India's diverse and culturally enriching environment. Transnational education, in which Indian universities establish campuses or offer programs in foreign countries, is gaining traction. Lifelong learning is no longer optional but it is a necessity to stay relevant in today's fast-evolving job. Courses on environmental, social, and governance (ESG) principles, green technologies and social entrepreneurship are not just electives but integral to shaping next generation for more equitable and sustainable future. Interdisciplinary learning, the blend of disciplines fosters creativity, critical thinking, and problem-solving skills, preparing students to tackle ambiguity and complexity. With 2025 declared as the "Year of Artificial Intelligence" by the All-India Council for Technical Education (AICTE), a clear roadmap has been set to empower over 40 million students across 14,000 colleges with AI-driven skills.

The University Grants Commission (UGC) reported that Indian institutions have expanded their global footprint with campuses in countries such as the United Arab Emirates, Malaysia, and Mauritius. Expanding digital education and updating curricula with job-oriented skills bridge the digital divide and addressing the workforce requirements of the future. At the same time, promoting STEM education, and incorporating bilingual medium of instruction or mother language can make education more accessible and foster deeper learning. The government has been encouraging research, innovation and entrepreneurship with initiatives like "Atal Innovation Mission" and schemes to promote start-ups, are creating an ecosystem that supports economic growth. The government provides emphasis to vocational and skill-based training in order to meet the needs of job market. The increasing involvement of private universities also leads to better infrastructure and curriculum design.

India's Great Student Out-Migration

In recent years there has been a surge of Indian youth migrating abroad for studies, crossing 7.5 lakh in 2022. As per latest statistics, Indian students going abroad for education increased by nearly 70% compared to 2021. Based on government official statements, a favoured destination, where the highest numbers of Indian students were migrating was USA followed by Canada and the United Kingdom. According to ministry of external affairs in Parliament in August 2022, Indians who travelled abroad for education between 2019 and 2022 ended up in 228 countries. While a majority of students from India continue to go to the developed world, a few of them are even going to less developed countries than India. The reason of such choices reflects the anxiety of an aspirational generation. The increased availability of loans to study abroad, the prevalent political, economic and cultural conditions in India fuelled the increased migration. Success stories of Indian-origin people in foreign countries are now getting greater visibility. As the demand for overseas education increased, consultancies, both foreign and indigenous, have mushroomed. And, this has led to more students getting scammed. The government has to introduce strict regulations and new legislation, and should identify genuine overseas education facilitators and control the new-born agencies.

Challenges

Indian institutions now face the challenge of positioning themselves among established international universities to attract students, faculty, and research funding. Despite the large number of institutions, the quality of education remains inconsistent across the country. Though there are many reputed institutions in India, a culture of research and innovation is still in nascent stage. In the search for better employment prospects, about

500,000 Indian students pursued higher education abroad in 2020, while only about 49,000 foreign students enrolled in Indian institutions. This disparity contributes to an annual economic loss for India, estimated at around USD 17 billion and the country experiences a depletion of valuable human resources, with many students opting to remain abroad after completing their studies. With over 800,000 students expected to travel abroad for higher education in 2025, costing Indian households nearly USD 70 billion, it's imperative for India to focus on creating world-class educational institutions at home. To stem the ongoing brain drain, we need strategic investments to make Indian universities globally competitive and also cater to the needs of rural and economically weaker students who still face barriers to access higher education. Increasing budgetary allocations for higher education is essential to enhance accessibility, equity, and excellence, helping us move closer to the National Education Policy (NEP) 2020 goal of a 50% Gross Enrolment Ratio (GER).

Striking the right balance between preserving indigenous teaching practices and incorporating innovative global methods is a delicate task that requires thoughtful adaptation. Many Indian institutions face challenges in ensuring good infrastructure, teaching staff and academic resources that might have a cascading effect on the quality of education and research. Institutions and colleges should ensure collaboration of academia with real world job requirements. LPG brings together individuals from diverse cultural backgrounds, which can lead to enriching interactions and challenges related to communication, understanding, and integration. By empowering institutions to innovate and expand without bureaucratic hurdles, the government can create an inclusive and dynamic higher education landscape that retains top talent and propels India into the league of global education powerhouses.

Conclusion

A revitalized higher education system will not only come up with intellectual growth of the nation but also place India as a competitive force on the global education platform. It is an investment in the nation's intellectual capital, it will promote innovation, critical thinking and socio-economic development. LPG of Indian higher education is progressive with far-reaching implications. Increase in international student enrolments, expanded partnerships and global presence of Indian institutions contributes to further growth and recognition on the world stage. To exploit fully the potential of LPG, India must continue to invest in quality education, research, and infrastructure, ensuring that the country becomes an attractive destination for both Indian and international students.

Hema Committee Report: Mollywood's Masculine Hegemony and Slaves Behind The Camera

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"The sky is full of mysteries, with the twinkling stars and the beautiful moon. However, scientific investigation revealed that stars do not twinkle nor does the moon look beautiful. The study therefore cautions :'Do not trust what you see; even salt looks like sugar!'"(Hema Committee Report).

The sky, often romanticised as a realm of infinite mysteries, appears adorned with glittering stars and an enchanting moon. Yet, scientific inquiry dismantles these illusions, revealing that stars do not truly sparkle, nor does the moon possess the ethereal beauty it seems to exude. This critical lens serves as a poignant metaphor for the deceptive allure of the Malayalam film industry—a world that thrives on the veneer of glamour while concealing its underlying exploitation. The seemingly dazzling facade belies the stark realities of systemic abuse, commodification, and the marginalisation of women within its structures. It is a cautionary reminder: "Do not trust appearances, for even salt can masquerade as sugar." This analogy underscores the need for an unflinching examination of the power dynamics and ethical compromises lurking behind the shimmering curtains of cinematic artistry.

The Report and The Context

A landmark report into the systemic challenges faced by women in the Malayalam film industry has exposed the pervasive exploitation and deplorable conditions within one of India's most celebrated cinematic hubs. The 290-page Hema Committee Report, commissioned by the Kerala government in 2017 and headed by a former High Court judge, details the entrenched dominance of a "mafia of powerful men" and the rampant sexual harassment of women in the industry. It highlights appalling working conditions, including the absence of basic amenities such as toilets and changing rooms for junior artists, lack of food, water, accommodation, and transport facilities, as well as meagre pay. The report notes that women are forced to urinate in bushes or behind trees, endure prolonged discomfort

during menstruation without the ability to change sanitary products, and, in some cases, suffer severe health issues requiring hospitalisation. Submitted to the government in December 2019 but made public only in 2024 following legal challenges, the report was instigated by the horrific 2017 sexual assault of an acclaimed actress. This case, which implicated a prominent actor in a criminal conspiracy, drew national attention to the patriarchal and exploitative structures underpinning the Malayalam film industry, and the legal proceedings against the accused continue to this day.

The Hema Committee Report, one of the most significant social documents to emerge in post-formation Kerala, transcends its ostensibly cinematic surface to reveal the grim and systemic realities concealed behind the alluring façade of the filmic world of capitalism. With a meticulously crafted scientific rationale, this report critically interrogates the deeply entrenched exploitation that forms the bedrock of modern capitalist histories. Serving as a profound social text, it offers a searing critique of the intersections between money power, patriarchal hegemony, and cultural commodification, while simultaneously delineating the dystopian trajectories of contemporary Kerala's socio-economic and cultural future.

For the discerning minds of the 21st century, the Hema Committee Report lays bare the dismal moral and ethical decay of Malayali social conscience, reflecting a failure to uphold the progressive values and transformative perspectives once envisioned. This report, comparable to a rigorously researched doctoral thesis on the intersection of cinema, gender, and industry dynamics, warrants serious intellectual engagement rather than the superficial trivialisation often witnessed in misguided television debates. Published during the centenary of the Vaikom Satyagraha—a landmark moment in Kerala's struggle for social justice—the report incisively exposes the entrenched caste and gender inequities that continue to plague Kerala's cinematic landscape. It boldly reveals the systemic exploitation of women across various platforms, particularly within the film industry, which epitomises the dual forces of capitalist patriarchy and the commodification of female bodies. As a historical document, it serves as a sobering indictment of the regressive structures that persist, thinly veiled beneath the guise of progress in an ostensibly enlightened society.

Cinematic Feudalism

The Hema Committee Report unveils the contours of a modern feudalistic system embedded within the Malayalam film industry, mirroring the

oppressive structures of medieval Europe described by historian Marc Bloch. Bloch's seminal work on feudalism in France identified its roots in agrarian economies, sustained by what he termed the "feudal mind"—a mental framework that normalised exploitation and hierarchical dominance. In this system, individuals lived as slaves not only to their masters but also to their own unconscious state of denial, accepting servitude as the natural order. Similarly, the cinematic world in Kerala operates on an insidious script driven by the same feudal mindset, where power and wealth dominate, and systemic oppression is woven into its fabric.

At the heart of this neo-feudal structure lies the commodification of women, whose bodies and minds are relentlessly objectified and exploited under the patriarchal gaze. The Hema Committee Report brings to light the grim realities of an industry that perpetuates a history of gender-based subjugation. Women in the film industry are relegated to mere tools of visual pleasure, their individuality erased, and their existence reduced to marketable assets. This modern iteration of feudalism thrives within the capitalist framework, where profit and money power supersede ethical considerations, reinforcing the entrenched inequalities of class, caste, and gender. The report paints a sobering picture of how a cultural space meant for creativity and expression has devolved into a system driven by exploitative hierarchies.

Disturbingly, this exploitation echoes the terminology of historical Smartha Vicharam proceedings, where accused women were dismissed as "commodities" in a deeply patriarchal judicial inquiry. The fact that such parallels can be drawn between Kerala's 19th-century feudalistic practices and its 21st-century film industry underscores the state's failure to shed the remnants of regressive social structures. Despite boasting the highest literacy rates and civic consciousness in the country, Kerala's cinematic sphere remains a battleground where caste and gender disparities are starkly evident. The Hema Committee Report forces society to confront this dissonance—a state proud of its progressive facade yet deeply entrenched in exploitative traditions reflected in the film industry.

Ultimately, the report serves as a mirror reflecting the feudalistic tendencies that persist within the capitalist framework of the Malayalam film industry. It challenges the veneer of glamour and sophistication, exposing the unchecked power dynamics and systemic abuses perpetuated in the name

of artistic expression. By drawing attention to these injustices, the report not only critiques the industry but also calls for a radical reimagining of its structures, urging Kerala to break free from the chains of its feudal past. Only by dismantling these deeply ingrained hierarchies can the film industry—and society at large—move towards a future of equality, creativity, and true progress.

'Fear' in the Report

The Hema Committee Report's credibility is deeply rooted in its meticulous methodology, which relies not on hearsay but on substantive testimonies collected through group meetings and exhaustive one-on-one interviews. Some of these interviews stretched for as long as ten hours, exposing a pervasive climate of fear that enveloped victims and complainants alike. This "world of fear," concealed beneath the allure of cinematic glamour, reveals a harrowing narrative of anti-women and inhumane practices that have persisted for decades. The testimonies highlight how systemic misogyny and exploitation thrive within an industry that paradoxically claims to be a space of cultural progress and creativity.

What makes this document a milestone is the extraordinary bravery of the women who risked societal ostracisation and professional jeopardy to bring these stories into the public domain. Their courage transforms the report into a liberative and revolutionary text, challenging the entrenched patriarchal structures of 21st-century society. It unveils a fearful history that is not just a critique of the Malayalam film industry but also a broader indictment of Kerala's inability to shed its feudal and patriarchal vestiges despite its claims of modernity and progressivism.

The Cinematic Chemistry of Human Rights Violations

The question of whether women were ever truly safe in the Malayalam film industry or whether their bodies were afforded basic respect is one that defies easy answers. The lack of preserved historical records erodes definitive conclusions, but anecdotal evidence paints a grim picture of systemic neglect and exploitation. Early accounts suggest that while male and female leads once had chairs marked with their names, the industry's subsequent growth and modernisation failed to address the most basic needs of its women artists. The Hema Committee Report sheds light on these indignities, particularly the absence of essential facilities for women on film sets. In a shocking revelation, women were often forced to relieve themselves in nearby bushes, dense thickets, or behind large trees due

to a lack of toilets and rest areas. This indignity was exacerbated during menstruation, when junior artists avoided water intake to manage the absence of privacy, leading to chronic health issues such as urinary tract infections. These stories speak not only to the neglect of women's physical needs but also to the dehumanisation inherent in the industry's systemic functioning.

The junior artists, who added life to dance sequences with their vibrant performances, often concealed tear-streaked faces from the unrelenting gaze of the camera. The report refers to these women as "slaves," a term that underscores their invisibility within the cinematic grammar designed to captivate audiences. Their bodies and labour became commodified elements of an exploitative system that ignored their humanity while benefiting from their contributions. This glaring disparity between the glamorous image projected by the industry and the harsh realities endured by its marginalised women artists reveals the deep-rooted structural inequalities that perpetuate such exploitation.

The Mentality of the Hunted

The systemic harassment and marginalisation of women artists within the Malayalam film industry reflect a disturbing psychology—the mentality of the hunted. These women live in a constant state of vigilance, forced to navigate an environment rife with exploitation and fear. The report lays bare the predatory culture where perpetrators hold positions of power, and victims, often from economically or socially disadvantaged backgrounds, are trapped in a web of silence and complicity. The very structure of the industry, with its unchecked hierarchies and male-dominated networks, fosters a culture where harassment is normalised, and speaking out is fraught with professional and personal risks.

This hunted mentality not only silences women but also conditions them to endure and internalise the abuse, normalising their suffering as part of the cost of their artistic careers. The contrast between the opulence enjoyed by male stars, with their caravans and air-conditioned spaces, and the indignities endured by women, highlights the stark gender divide within the industry. Women, whether senior actors or junior artists, are relegated to the margins, their voices stifled and their humanity disregarded.

A Narrative of Regression

The image of male stars reclining in luxury caravans while women are compelled to find shelter behind trees is a poignant metaphor for the

regressive trajectory of cinema's progress. The Hema Committee Report forces us to confront this historical regression, challenging the narrative of modernity and progress often associated with Kerala's cultural landscape. It demands not only an acknowledgment of the systemic exploitation that defines the industry but also a radical reimagining of its structures.

To move forward, the film industry must address the deeply ingrained inequalities that sustain its functioning. This involves not only providing basic facilities and safeguarding the dignity of women but also dismantling the patriarchal mindsets and feudal hierarchies that perpetuate this exploitation. The report is more than a document; it is a call to action, urging society to break the chains of fear and oppression and create a cinematic world that respects and uplifts all its participants equally.

'Adjustment' and 'Compromise': The Semantics of Exploitation in Mollywood

Within the linguistic framework of Mollywood, two deceptively innocuous words— 'adjustment' and 'compromise'—resonate with the oppressive weight of systemic exploitation. The Hema Committee Report elucidates how these terms, seemingly mundane in their everyday usage, have been weaponised to camouflage abuse, creating a lexicon of oppression that reinforces patriarchal dominance. Much like how phrases such as "social distancing" and "quarantine" became ubiquitous during the pandemic to normalise an extraordinary situation, these words have been co-opted to mask the violent realities of gendered power dynamics in the Malayalam film industry. From the perspective of semiotics, these terms function as linguistic signs whose underlying meanings have been corrupted by power. 'Adjustment' and 'compromise' do not merely denote flexibility or negotiation; they symbolise a coercive exchange where women are pressured to relinquish their dignity and autonomy in return for opportunities. These words, replete with euphemistic undertones, hide the structural violence embedded within the industry's fabric. They trivialise the pervasive exploitation of women, transforming acts of abuse into supposedly necessary rites of passage for those seeking to establish themselves in the cinematic realm.

The semantic manipulation of these terms underscores the hidden power structures within the Malayalam film industry. Borrowing from Michel Foucault's analysis of power and discourse, the use of such language reinforces a patriarchal narrative where women are relegated to objects

of exchange, rather than active participants in their craft. The veneer of professional terminology cloaks an exploitative system, reducing aspirations of women to commodities for negotiation. The very act of using words like 'adjustment' and 'compromise' normalises subjugation and reinforces the industry's unspoken codes, ensuring compliance through fear and silence. Moreover, this linguistic practice serves to institutionalise exploitation, blurring the boundaries between opportunity and abuse. Women, lured by the promise of cinematic roles, find themselves ensnared in a network of commodification that mirrors sex-trafficking circuits. The predatory misuse of language creates a symbolic order where power is concealed, and perpetrators manipulate the semantics of consent to legitimise their actions. This distortion of language reflects broader societal patterns where linguistic practices are employed to sustain hierarchies and perpetuate systemic gender inequalities.

The Hema Committee Report thus emerges as a critical text, exposing not only the predatory behaviour rampant in Mollywood but also the ideological underpinnings that sustain it. By dissecting the semantics of 'adjustment' and 'compromise,' the report lays bare the manipulative strategies that perpetuate patriarchal control. To challenge this exploitative system, it is imperative to interrogate the language of abuse and reclaim the vocabulary of agency, dignity, and justice for the marginalised voices within the industry.

Phallocentrism in Mollywood

The Malayalam film industry, colloquially known as Mollywood, epitomises the oppressive phallocentric paradigm that Luce Irigaray critiques in her seminal work, *Speculum of the Other Woman.* Irigaray's analysis of masculinity's dominance through the systematic suppression and denial of the feminine resonates deeply with the power dynamics of this industry. Women in Mollywood have long been reduced to silhouettes of the male imagination, their identities appropriated and rewritten to serve the patriarchal gaze. This projection of male fantasies onto women not only erases their agency but also entrenches a cultural narrative where women exist solely as objects to be consumed, controlled, and commodified.

Within this patriarchal cinematic framework, women are subjugated to the roles of passive enablers, integral yet powerless components of a larger, masculine-controlled apparatus. They are often trapped within a performative subservience, perpetually relegated to roles that reinforce

male dominance both on and off the screen. The masculine ideology entrenched in Mollywood's structures operates as a colonising force, dictating the terms of their participation and silencing any dissent. This hegemonic narrative positions men as the sole arbiters of creative and commercial decisions, thereby creating a gendered hierarchy that marginalises women's voices and contributions.

The Women's Collective

Resistance to this entrenched phallocentrism emerged only through the Women in Cinema Collective (WCC), a pivotal movement in the history of Mollywood. The WCC represents a counter-hegemonic force, challenging the oppressive structures that have historically silenced women in the industry. By naming and resisting the systemic inequalities embedded within Mollywood, the WCC disrupted the carefully maintained facade of gender neutrality. Their collective voice brought the hidden power dynamics into sharp relief, exposing how the industry thrives on the exploitation of women's labour and bodies while denying them recognition, dignity, and equity. The solidarity forged by the WCC extends beyond mere resistance; it seeks to reconstruct the very fabric of cinematic culture. Their efforts to rebuild social relationships and develop a language that recognises women's autonomy represent a direct challenge to the patriarchal norms of the industry. The WCC's agenda calls for an ethical recalibration, one that acknowledges the creative, emotional, and physical labour of women in Mollywood. By reclaiming the narrative, the WCC not only advocates for gender justice but also underscores the need for a cinema that respects individuality and dismantles oppressive structures.

The Panopticon in Mollywood

The transition of Malayalam cinema into Mollywood's capitalist ethos further entrenched a panopticon-like system where commerce and capital wield absolute control. Drawing from Michel Foucault's metaphor of the Panopticon, the industry operates as a self-regulating mechanism, wherein the omnipresent gaze of commerce ensures compliance and subjugation. The rise of the 'star kings' and their tightly controlled entourages exemplifies this dynamic. These male stars dominate the cinematic space, dictating the terms of engagement and reinforcing a culture of unquestioning loyalty and obeisance. Women, in contrast, are relegated to the periphery, their roles reduced to fleeting moments of glamour or commodified objects of desire. This panoptic system extends beyond the

screen into the lived realities of women in Mollywood, whose experiences are marked by surveillance, control, and fear. The commercialisation of cinema has amplified these dynamics, prioritising profitability over artistic integrity and human dignity. The result is a narrative of historical regression, where women, even in the 21st century, find themselves living in the shadow of trees—forced into invisibility by an industry that thrives on their marginalisation. The stark juxtaposition of this reality against the claims of cinematic progress exposes the deep schisms within Mollywood's cultural ethos.

Key Recommendations of the Hema Committee Report

Mandatory Internal Complaints Committees (ICC): The report highlights the urgent necessity of establishing Internal Complaints Committees (ICCs) in strict accordance with the provisions of the Sexual Harassment of Women at Workplace (Prevention, Prohibition, and Redressal) Act, 2013. It further recommends that these committees include representatives from the Film Employees Federation of Kerala (FEFKA) and the Association of Malayalam Movie Artists (AMMA), ensuring accountability and industry-specific representation.

Establishment of an Independent Tribunal: Acknowledging the systemic deficiencies in addressing grievances, the report advocates for the creation of an independent tribunal dedicated to handling cases of harassment and discrimination within the cinema industry. To uphold privacy and dignity, it is proposed that the tribunal conduct in-camera proceedings, with strict confidentiality maintained by withholding the names of those involved from media coverage.

Institutionalisation of Written Contracts: The report underscores the critical importance of mandating written contracts for all categories of employees in the film industry, including junior artist coordinators. Such documentation is viewed as essential for safeguarding the rights and interests of workers while ensuring transparency and legal accountability across professional engagements.

Mandatory Gender Awareness Training: To address entrenched gender biases, the report recommends compulsory gender sensitivity training for all cast and crew members prior to the commencement of production. These training programmes should be tailored to the specific dynamics of the film industry and made accessible in both Malayalam and English, with online resources ensuring wider reach and compliance.

Promoting Women in Leadership Roles: The report advocates for the provision of adequate and timely financial support to women taking on producer roles or other leadership positions within the industry. This measure is seen as a vital step towards dismantling entrenched patriarchal structures and fostering equitable representation at the highest levels of decision-making. Together, these recommendations represent a comprehensive roadmap for addressing gender inequities and power imbalances within the Malayalam film industry, offering a model for transformative reform across India's cinematic landscape.

Concluding Analysis

Mollywood's evolution from a regional film industry to a global cultural brand has been marred by its persistent failure to uphold the principles of gender equity and individual autonomy. The industry remains deeply entrenched in phallocentric and capitalist structures, perpetuating a systemic culture of exploitation, commodification, and the suppression of dissenting voices. The Hema Committee Report, with its incisive documentation, stands as a scathing indictment of the regressive and patriarchal ethos that continues to underpin the industry, reflecting its inability to extricate itself from its feudalistic legacy. It is commendable that the Kerala government has initiated such an unprecedented and bold inquiry, setting a significant precedent for introspection within the Indian film industry. This progressive step must serve as a clarion call for similar critical interventions in Bollywood, Tollywood, and other cinematic domains, where women stars remain subjugated and commodified under the unyielding hegemony of masculine authority. Such a movement is imperative for dismantling systemic inequities and ensuring the emancipation of women in the cinematic arts.

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Women Empowerment and Gender Equality: A Peep into Realities

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The journey towards women's empowerment and gender equality in India is marked by resilience, struggle, and optimism. Although significant strides have been made in addressing gender disparity, the challenge of overcoming deeply rooted patriarchal norms and achieving genuine women empowerment and gender parity in India continues to be difficult. This article explores the various dimensions of women's empowerment and gender equality in India, emphasizing the initiatives supporting women, the advancements achieved, the challenges that linger, and the necessary actions to foster a gender-equal India.

Women Empowerment, broadly, refers to the process by which women gain power and control over their own lives and acquire the ability to make strategic choices. It involves promoting a sense of self-worth among women, along with their ability to determine their own choices, and their right to influence social change for themselves and others.

Now, what about Gender equality? As per the UN Women, Gender Equality refers to the equal rights, responsibilities, and opportunities of women and men and girls and boys. Gender-Equality does not mean that women and men will become the same. Rather, it seeks to do away with gender inequality by stipulating that the rights, responsibilities, and opportunities for men and women will not depend on their gender. Gender- Equality is considered as both a human rights issue and as a precondition for, and indicator of, sustainable people-centred development.

If we take a quick glance at our history, we can see light and shadows. On one hand, Indian society has always worshipped women with many female deities Saraswati, Durga, Lakshmi, Kali, etc. On the darker side, with discrimination against them prevailing since the Vedic period, with customs and traditions favouring men.

The beginning of organized efforts for the empowerment of women and gender equality in India can be traced back to the Socio-Religious Reforms Movements of the 19th century led by Raja Rammohan Roy, Swami

Dayananda Saraswati and their related organisations. Later in early 20th century, Women's Organizations such as Bharat Mahila Parishad, All India Women's Conference, etc raised the issue of gender inequality in India and demanded women's suffrage, and inheritance rights along with others.

And not to forget, Gandhi's emphasis of active women participation in freedom struggle. Following India's independence, there was a lull in women empowerment and gender parity movement as focus was mainly on the task on nation building.

Later, during the post-1970s, which is widely known as the second phase of the Indian women's movement, India witnessed a renewal of women empowerment and gender equality movement. Prominent women's organizations took up a much wider range of initiatives, promoting gender equality and women's empowerment in India, such as Self-Employed Women's Association (SEWA) worked to improve conditions of women working in unorganized sector; Annapurna Mahila Mandal (AMM) worked for the welfare of women and girl children.

The present status of women in India is characterized by a complex interplay of progress and ongoing challenges. Some significant achievements have been made towards Gender Equality and Women Empowerment. However, deeply entrenched societal norms, economic disparities, and political challenges mean that Gender Disparity continues to exist in India.

As far as debate on women empowerment is concerned, two diagonally opposite views can be seen in the present Indian society:

- Gender Disparity is Natural – The inequality between the sexes is based upon the biological or genetic differences between men and women.
- Gender Disparity is Artificial – Gender roles are culturally determined and inequality between the sexes is a result of a long-drawn process of socialization.

If we quote numbers, according to the Gender Gap Report, 2024, India ranks 129 out of 146 countries in terms of gender parity. As per the National Family Health Survey (NFHS-5, 2019-21), the Overall Sex Ratio in India is 1020 females per 1000 males. However, the Sex Ratio at Birth remains low at 929, indicating continued sex selection at birth. As per the NCRB's "Crime in India" 2021 report, over 4 lakh cases of crimes against women were recorded in the year 2021. With this figure reflecting only

the reported incidents, the actual figure remains much higher.

Economic disparity can be quoted from the ILO report. It states 81.8 percent of women's employment in India is concentrated in the informal economy. This indicates that most of the female workers in India are not able to get into high-paying jobs. Also, the fact that at present, only 14.94% of the total number of Members of Parliament (MPs) are women indicates political disparity.

India has made strides in a number of areas to empower and give its women a voice, but the path to women's empowerment is lengthy and complicated, with many obstacles still standing in the way. Indian government has made women's power, or Nari Shakti, the focal point of its plan to develop India by 2047, recognizing that attaining gender equality will take time Adopting laws, regulations, and programs that uphold women's rights and advance gender equality has been one of the most significant advances in this direction.

Most recently, the government is conducting an exercise using various methodologies to quantify the contribution of household chores performed by women to the country's gross domestic product (GDP).

To help address the decline in the child sex ratio, defined as the number of girls per 1000 boys aged 0-6, the government announced the 'Beti Bachao Beti Padhao' initiative.

To ensure increased economic participation by women, several provisions are being incorporated into major labour laws to promote a healthy and safe working environment for women. For example, paid maternity leave has been increased from 12 weeks to 26 weeks and establishments with 50 or more employees are mandated to offer crèche facilities.

The focus is also shifting from just development to 'women - led development' by maximising women's access to education, offering skill training and institutional credit. For instance, under the MUDRA Yojana (Micro Units Development and Refinance Agency Ltd), the Mahila Udhyami Yojana enables women entrepreneurs to easily avail of financial aid up to INR 1 million at concessional rates.

The private sector is also focusing on bridging the gender gap and partnering with public sector entities to empower women, both within and outside office boundaries. For instance, ride- hailing startup Ola cabs recently shared that it would employ an 'all - woman' workforce at its upcoming two - wheeler factory in Chennai.

It is also observed that the number of women graduates with the degrees in STEM disciplines (Science, Technology, Engineering or Mathematics) are higher than ever before, but these gains have not translated to increased numbers in workforce.

While this is just a glimpse into the changing working landscape, much has been done and there is much more to be done.

Achieving gender equality and women empowerment in India is a complex challenge that involves socio-cultural, economic, and political factors. Women empowerment is essential for achieving gender equality.

Comprehensive and multi-pronged strategies such as; providing political representation, skilling, access to credit, changing social attitude towards women and leadership development; are to be adopted to overcome the continued prevalence of gender disparity or gender inequality in India.

Seventy-Five Years of Our Constitution and Social Equality

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This year, while celebrating our 76th Republic Day on January 26, 2025, we were also celebrating the completion of 75 years of the enactment of our Constitution on the same day in 1950 that established India as a sovereign, democratic Republic, charting its identity and future course as a nation. The Preamble of the Constitution, as amended by the 42nd Amendment Act in 1976, by adding the words 'socialist,' 'secular,' and 'integrity' has been standing as the guiding light in the journey of this great plural, diverse, multi-religious, multi-linguistic, multi-ethnic nation.

In the context of the 76th year of Constitutional journey, it is important that we discuss the principle of equality, the cornerstone of democracy, and its prevalence in the society. It is also equally important to base the discussion on Article 14 of the Constitution that states, "The State shall not deny to any person equality before the law or the equal protection of the laws within the territory of India" and Article 15 that states "The State shall not discriminate against any citizen on grounds only of religion, race, caste, sex, place of birth or any of them."

While enquiring into the existence of equality in the society, the thought that should be the basis of our understanding should be what Dr Ambedkar clearly stated, "political democracy cannot last unless there lies at the base of it social democracy." Here, let us examine the hierarchical structures in our society that have institutionalized, sanctioned, and normalized inequality and whether Constitutional values have been able to change them and to what extent.

Has the caste system, a characteristic feature of traditional India that has normalized inequality, denying the basic human rights of large sections of people, granting privileges to the ones at its top, changed with equality as a fundamental right and the abolition of untouchability by the Constitution? We can say that though some changes have happened in the nature of the caste system, it still persists in the society in various forms of

violence against Dalits, honour killings, the underrepresentation of them in the economic, social, political, and cultural structures of society, the prevalence of casteism, Khap panchayats, insistence on endogamy, etc.

It is no different when it comes to class, a universal system of inequality that places human beings in hierarchies based on their economic status. Associated with non-inclusive and jobless growth are huge income inequalities that put the poor of the country in a position of severe disadvantage, even denying their basic human rights.

In case of gender equality, though we have made some progress on the basis of various legislations and judicial interpretations on the basis of equality that Constitution provides, patriarchy hesitates to wither away. When violence against girls and women in the form of female foeticide, infanticide, domestic violence, rape and murder, sexual harassment at work, acid attacks, marital rape, dowry harassment, etc., are getting reported more, along with the inadequate and deliberate underrepresentation of women (when not mandated by reservation) are examples of the fact that we are lagging behind when it comes to treating women as equal citizens. This is also true in the case of equal rights to transgenders and individuals of different sexual orientation.

Another reality of our society that generates concern is the increasing discrimination and othering based on religion, antithetical to the principle of secularism that our Constitution stands for. When there is the spread of distrust among different religious communities, we need to introspect how much we have imbibed the Constitutional principle of secularism.

In addition to these, the various forms of exclusion and lack of integration that differently abled and digitally excluded individuals face also speak volumes for the inadequate imbibing of the value of equality in society. Here it is pertinent to discuss the reasons for it and suggest solutions that would lead us towards an equal society.

First, the principle of equality was introduced in a traditional society that was not modernized enough to move away from hierarchical structures. So, throughout our 75 years with the Constitution there has been conflicts with Constitutional values and the principles propounded by religious and social structures. Also, the process of globalization the most characteristic feature of societies across the world, leading to cultural homogenization, has been in a way leading people towards a search into their roots, placing

much value on tradition. The economic and technological modernity is also accompanied by a kind of adherence to tradition and rituals. When tradition becomes something that cannot be questioned, we tend not to take note of the patriarchy and casteism inherent in many traditions.

What should we be doing at this point to internalize and practise the Constitutional value of equality, which is essential for social justice, without which our democracy would lose its essence? Rather than viewing equality as a mere theoretical principle, there is the need to translate it into our political, legal, professional, and societal structures. First and foremost, our families should be the spaces where the voices of all, of children, aged, women and men are equally heard and are treated as equal individuals and marriages should be egalitarian. Our classrooms should move away from hierarchical structures, free of any discriminatory treatment towards students, and education system should inculcate the importance of equality in children.

Our work spaces, political spaces and public spaces should give adequate representation to all sections of society irrespective of the differences that exist among people. There should be more focus on inclusive politics ensuring adequate representation of women, transgenders, Dalits, and all marginalized sections of the society. There should be adequate institutional and policy measures to address the income gap between the minority rich and the majority poor and focus should be on their access to health and education. Along with this, there should be strengthening of pluralism and diversities where all voices are expressed and heard with equality.

So, though we have achieved a lot, keeping our democracy live and pluralism intact, there is a long way for us to go as a society in our journey ahead with the Constitution. When the Constitution exists as a live document incorporating the changes in society and leading society towards change there should be genuine and deep parallel efforts in society to modernize our social practices and structures on the basis of the value of equality so that we are able to grant every citizen of the country equal rights irrespective of caste, gender, language, religion, and wealth.

Demographic Winter and Its Multidimensional Implications

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In recent years, a quiet but profound shift has begun to unfold across the globe, one that is reshaping economies, societies, and political landscapes. This shift, often referred to as "demographic winter," marks a long-term decline in birth rates—particularly in developed and emerging economies—that is expected to have far-reaching consequences. While the world once worried about overpopulation, the reality today is that many nations are facing the opposite problem: shrinking populations, aging societies, and a dwindling labor force. This demographic shift is already beginning to affect everything from economic stability to social cohesion and global influence. At its core, demographic winter occurs when fertility rates fall below the replacement level of 2.1 children per woman, the number needed to maintain a stable population. In many parts of the world, fertility rates have been dropping for decades. Factors like economic instability, changing social norms, urbanization, and a greater focus on careers over family life are all contributing to the trend. Countries that have long been experiencing population stagnation include Japan, South Korea, Italy, Germany, and China. However, more recently, even regions that were once known for their higher birth rates, such as South Asia, are beginning to see a sharp decline in fertility.

Several interrelated factors are driving this decline. The first is economic uncertainty. Rising costs of living, job instability, and expensive housing make it more difficult for young couples to afford children. Additionally, many young people today are delaying marriage and childbirth in favor of pursuing their careers, education, and personal development. As a result, family formation is often postponed, leading to smaller families when people do eventually settle down.

Another contributing factor is urbanization. Living in cities often means limited space, high living costs, and a faster-paced lifestyle—none of which are conducive to raising large families. As cities become more crowded, the idea of having many children becomes less practical.

The increasing role of women in education and the workforce has also played a significant role in fertility decline. As women gain access to better educational opportunities and enter the workforce in greater numbers, many choose to delay childbearing or forgo it altogether in favor of career advancement. Similarly, the rise of non-traditional family structures, such as single-parent households and unmarried couples, is contributing to lower birth rates.

According to The Lancet, global fertility rates have plummeted over the past 70 years, from 4.84 children per woman in 1950 to 2.23 in 2021. Projections indicate that this rate will continue to fall, reaching 1.83 by 2050 and 1.59 by the year 2100.

The economic consequences of demographic winter are already being felt, and they will only become more pronounced in the coming decades. One of the most immediate effects is the shrinking workforce. With fewer young people entering the labor force, productivity will likely decrease, and economic growth may stall. This poses a significant challenge for countries that rely on a large and diverse workforce to maintain economic stability.

A smaller working-age population also means there will be fewer people contributing to social security and pension systems, making it increasingly difficult to support a growing elderly population. This shift could lead to higher taxes or cuts to public services, which could further strain economies already facing financial challenges.

The housing market, education sector, and retail industries are also feeling the effects of demographic decline. When fewer young families, demand for housing, schools, and consumer goods is expected to decrease. This could lead to economic stagnation, particularly in industries that depend on population growth.

Beyond the economic fallout, demographic winter is also having profound social and cultural implications. Traditional family structures are breaking down as people delay or decide against marriage and childbirth. This means that older generations may not have the same level of support from younger family members, which could lead to greater social isolation and increased caregiving burdens.

Loneliness and mental health issues are likely to rise as a result of smaller family units and fewer intergenerational connections. For the elderly,

the lack of family support can be especially challenging, as they may face difficulties accessing care or companionship. Moreover, as populations age, healthcare systems will come under increasing pressure to meet the needs of an older population, requiring significant investment in elder care, medical services, and long-term care facilities.

In countries like India, which is also facing a demographic shift, the elderly population is expected to rise dramatically over the next few decades. The proportion of people aged 60 and above is predicted to increase from 8.6% in 2011 to 20.8% by 2050. Unlike many East Asian countries that have implemented policies to provide healthcare and social support for the elderly, India is struggling to develop a robust infrastructure for elder care. The lack of universal pension schemes, comprehensive health insurance, and social care services for seniors is a growing concern, especially for those who work in the informal sector or live-in rural areas.

Reports from organizations like the Longitudinal Ageing Survey in India (LASI) and HelpAge India highlight that many older people suffer from chronic illnesses like diabetes, hypertension, and cardiovascular diseases. In rural areas, where access to healthcare is limited, the elderly often continues working out of financial necessity. They may live alone or depend on domestic help, but without sufficient income or social support, their quality of life can suffer.

Demographic winter also has significant geopolitical and national security implications. As populations shrink, countries will struggle to maintain military recruitment, leaving them vulnerable in terms of national defense. A smaller, aging population reduces a country's ability to project power on the global stage, which may weaken its political and economic influence.

Many countries are attempting to address these issues by adopting immigration policies to boost population numbers and fill labor shortages. However, immigration comes with its own set of challenges, including potential social and cultural tensions, as well as difficulties integrating newcomers into society. This can lead to political instability, particularly if immigration is not carefully managed.

South Asia, in particular, is experiencing rapid declines in fertility rates, which could have a major impact on the region's future. In countries like India, Pakistan, and Bangladesh, birth rates are expected to drop significantly over the next few decades. In 2021, the region saw 32 million births, but by 2050, that number is expected to fall to 18.7 million. If this

trend continues, the global population could be very different by the end of the century, with fewer countries maintaining replacement-level fertility.

Demographic winter is one of the most pressing issues facing the world today. Its far-reaching implications are already becoming evident in the form of economic challenges, social changes, and geopolitical shifts. To address these issues, countries must adopt comprehensive strategies that focus on both encouraging higher birth rates and preparing for an aging population. This includes policies that support families, provide financial security for the elderly, and invest in healthcare and social services.

Governments will also need to adjust their immigration policies to balance the need for workers with the challenges of social integration. At the same time, more focus must be placed on developing innovative solutions to care for the elderly and ensure they can live with dignity in an increasingly aging world.

Without a concerted effort to address demographic decline, many nations may face economic stagnation, reduced geopolitical influence, and growing social inequality. By embracing proactive and sustainable policies, however, societies can mitigate the challenges of demographic winter and create a more stable and prosperous future for all.

100 Years of Indus Valley Civilization

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The Indus Valley Civilization, which thrived along the banks of the Sindhu River and its tributaries between 3300 and 1300 BCE, with its mature phase spanning from 2600 to 1900 BCE, marked the centenary of its discovery in September 2024. This milestone has had a significant impact on India's historiography, cultural heritage, and the construction of its national identity.

Features of the Indus Valley Civilization

The Indus Valley Civilization (IVC), one of the earliest urban civilizations, exhibited remarkable advancements in town planning, agriculture, economy, crafts, institutions, and religion. These features collectively highlight the sophistication and organization of the civilization.

One of the most striking features of the Indus Valley Civilization was its highly organized town planning system. Cities such as Harappa and Mohenjodaro were built following a grid pattern, with well-planned streets and systematically arranged houses. Each city had a citadel or acropolis, likely occupied by the ruling elite, while the common people resided in the lower town. The use of burnt bricks in construction was a distinctive characteristic, setting the civilization apart from contemporary Egyptian societies, which primarily used dried bricks. The drainage system of Mohenjodaro was highly advanced, with every house equipped with its own courtyard and bathroom.

Agriculture was the backbone of the Indus Valley economy, with most villages situated near floodplains to ensure sufficient food production. The people cultivated wheat, barley, rai, peas, sesame, lentils, chickpeas, and mustard. Millet was grown in Gujarat, although rice was less commonly used. The Indus people were among the earliest cultivators of cotton. Although agricultural practices are difficult to reconstruct, seals and terracotta figurines indicate that oxen were used for ploughing. In addition to farming, the Harappans engaged in large-scale animal husbandry. Although some evidence of horses has been discovered, it remains inconclusive, suggesting that the civilization was not centred around horse domestication.

Trade played a crucial role in the Indus Valley Civilization, as evidenced by the presence of numerous seals, a uniform script, and standardized weights and measures. The economy was primarily based on barter, with metal currency not yet in use. The Harappans engaged in extensive trade of stone, metal, and shell materials. They also navigated the Arabian Sea and established trading colonies, such as the one in northern Afghanistan, facilitating commerce with Central Asia. Additionally, the civilizationmaintained trade relations with Mesopotamia, exchanging goods with people in the Tigris and Euphrates regions. Long-distance trade in lapis lazuli, a semi-precious stone, suggests that it may have been a symbol of prestige among the ruling class.

The Harappans demonstrated expertise in various crafts, particularly in metallurgy and pottery. They manufactured and used bronze extensively, sourcing copper from the Khetri mines in Rajasthan and tin from Afghanistan. Textile impressions found on several objects suggest knowledge of fabric production. Large brick structures indicate the prominence of masonry as a specialized craft. Other skilled trades included boat-making, bead-making, seal-making, and terracotta production. The civilization's goldsmiths crafted intricate jewellery using silver, gold, and precious stones. The potter's wheel was widely used, and Harappan pottery was distinguished by its glossy and polished finish.

Despite the discovery of some written materials, the Indus script remains undeciphered, making it difficult to ascertain the exact nature of governance and social institutions. No temples have been found, leading scholars to rule out priestly rule. Instead, it is speculated that Harappa was governed by a class of merchants or traders. Some archaeologists suggest that the civilization had no central ruler, while others propose a decentralized system with multiple local rulers governing different urban centres.

Religious beliefs in the Indus Valley Civilization were centred around fertility worship and animism. Numerous terracotta figurines of women, some depicting plants growing from their wombs, indicate reverence for a fertility goddess similar to the Egyptian deity Isis. A male deity, identified as Pashupati Mahadeva, is depicted on seals with three horned heads, surrounded by animals such as elephants, tigers, and rhinoceroses. The civilization also worshipped trees and animals, particularly the one-horned unicorn and the humped bull. The discovery of numerous phallic symbols and amulets further supports the belief that fertility and protection played a significant role in their spiritual practices.

Significance of Indus Valley Civilization

The Indus Valley Civilization (IVC) holds immense historical and cultural significance, influencing various aspects of modern society.The metic-

ulous urban planning of the Indus Valley Civilization serves as an exemplary model for modern cities struggling with unplanned growth. The grid-based layout, well-structured drainage systems, and zoning of residential, commercial, and administrative spaces demonstrate an advanced understanding of urban management. Today's cities can learn from this systematic planning to tackle issues such as overcrowding, sanitation, and environmental sustainability.

The debate on the necessity of privacy in data protection, along with the ruling in the landmarkPuttaswamy case (2017), underscores the critical importance of privacy. The Indus Valley Civilization offers valuable insights into the concept of privacy, as reflected in its architectural designs and urban planning.The architecture of IVC reflects a conscious effort to ensure privacy. Houses were built with courtyards, enclosed spaces, and strategic orientations that minimized external intrusion. This highlights the civilization's awareness of personal space reinforcing the fundamental human need for privacy, which remains a crucial aspect of modern urban housing and legal frameworks.

The recent announcement by Tamil Nadu Chief Minister Sri M.K. Stalin, offering a one-million-dollar reward for deciphering the Indus script, highlights its deep significance in Dravidian politics. Some scholars link the Indus Valley Civilization to proto-Dravidian culture, arguing that the decline of IVC led to southward migrations. This connection has influenced Dravidian political narratives, reinforcing claims of an ancient, indigenous identity separate from later Aryan influences. Political discourses in South India often highlight this perspective to assert historical continuity and cultural pride.

The Indus Valley Civilization appears to have been largely peaceful, with no significant evidence of large-scale warfare or militarization. The absence of fortifications in many sites suggests that conflict was minimal. This emphasis on harmony aligns with the later development of ahimsa (non-violence), a principle central to Jainism and Buddhism, underscoring the long-standing South Asian tradition of peaceful coexistence.

Conclusion

The Indus Valley Civilization was an advanced urban society with a well-planned infrastructure, a flourishing agricultural economy, extensive trade networks, and sophisticated craftsmanship. Its institutions remain a subject of debate due to the undeciphered script, but its religious practices indicate deep-rooted spiritual beliefs. The legacy of the Indus Valley Civilization continues to provide valuable insights into the early development of human societies.

Spice Route: India's Answer to China's Silk Route

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The Spice Route was an ancient trade network primarily through sea routes, in contrast to the Silk Route, which was predominantly a land-based network. While China gained prominence through the Silk Route as a major producer and exporter of goods, India played a pivotal role in the Spice Route, producing and exporting exotic spices nurtured by its tropical climate. This route, which connected East Asia with the West, contributed significantly to the spread of Indian food culture, or the 'Indian flavor,' across different regions. The term 'spice' serves as an indicator, as this route not only facilitated the movement of spices but also enabled the exchange of various materials, ideas, people, religions, and cultures. The early Indian influence of natural worship and later the spread of Hinduism, Buddhism, and Jainism might have been disseminated through the Spice Route. Conversely, India was also influenced by Christianity and Islam through the same network.

The etymology of the word 'spice' traces back to the Latin language, where it signifies 'items of special value.' Spices have retained their prominence since ancient times due to their multiple uses—as food preservatives, medicinal ingredients, ritualistic elements, and flavoring substances, among others. Their small and dried nature made them easily transportable.

Archaeological and textual evidence points to a thriving spice trade between South Asia and the early Greek and Roman Empires, potentially dating back to the 11th-12th century BCE or even earlier. Surviving ancient cookery accounts emphasize the extensive use of spices in various cuisines. As a major spice-growing region, India was highly sought after by European traders. Known as the 'Land of Spices,' India cultivates more than half of the 109 spices recognized by botanists, showcasing its rich agricultural heritage and favorable climate. The country exports major spices such as turmeric, cumin, coriander, fenugreek, and pepper. Black pepper, known as the "King of Spices," and cardamom, the "Queen of Spices," were particularly prized.

The Spice Route extended both west and east of India, with the country holding the position of a net exporter of spices. The route stretched from the west coast of Japan, through the islands of Indonesia, around India, to the lands of the Middle East, and from there across the Mediterranean to Europe, covering a total distance of over 15,000 kilometers. The main consumers of spices were people in the Middle East and Europe, where the climate and soil were unsuitable for spice cultivation, but where spices were crucial for food preservation.

South India dominated the cultivation and trade of spices, with the Malabar Coast, Konkan Coast, and the Canara coastal areas, along with some ports in present-day Gujarat, witnessing a high influx of foreign ships collecting spices. Cochin and the Malabar Coast were leading producers of pepper. In the coastal regions along the Bay of Bengal, cloves were grown in significant quantities. Muziris, an ancient and prosperous Indian port, is extensively mentioned in Tamil Sangam literature and in the accounts of the Roman philosopher Pliny as an important center for spice trade.

The Chinese also consumed large quantities of spices traded from India and Southeast Asia. Arab travellers' accounts mention Canton (Kanfu) as a significant Chinese port for trade, with numerous Indian ships docking there. Chinese records also reference Indian traders and the presence of Hindu temples in Canton, indicating frequent visits by Indian merchants.

The Spice Route was a more stable trade network compared to the Silk Route, as sericulture techniques spread beyond China, reducing its monopoly over silk production. By the late Gupta period, Arabs had learned the technique of sericulture, diminishing the significance of the Silk Route, as noted in Guptan sources. Silk cultivation had reached Japan by 300 AD, and by 552 AD, the Byzantine Empire had acquired silkworm eggs, initiating silk production. Arabs also began manufacturing silk around the same time, and the Industrial Revolution later shifted Europe's focus to cotton production, making silk a less dominant trade commodity.

In contrast, the importance of spices endured for over a thousand years, significantly contributing to colonial domination over the Indian subcontinent and East Asia. The increasing demand for Asian goods in Europe, termed the "Commercial Revolution" by historians, was largely driven by the spice trade. The high demand for spices is evident in the me-

dieval price disparity: a sack of pepper that cost only five dinars in Kerala soared to 115 dinars when sold in Europe through Arab intermediaries.

The spice trade significantly influenced global exploration, trade routes, cultural exchange, and the rise and fall of empires. European powers, driven by the lucrative spice market, sought new maritime routes to the East. This pursuit led to Vasco da Gama's circumnavigation of Africa in 1498, opening direct access to Asian spice markets and triggering intense competition among European nations. Spice monopolies generated immense wealth, contributing to the expansion of European powers and the establishment of vast colonial empires.

Throughout the 17th and 18th centuries, the spice trade was dominated by the East India Company. With the colonization of distant lands, European powers introduced spice cultivation outside its regions of origin. As a result, spice prices began to decline, and spices ceased to be exclusive trade commodities around which wealthy monopolies were once built. The onset of globalization can be traced back to the spice trade, as it laid the foundation for interconnected economiesand international commerce.

Even today, India remains a global leader in spice production and exports.The country's spice industry has evolved with modern agricultural techniques, research, and global trade policies. Indian spices continue to be in high demand, not only for culinary purposes but also for their medicinal and therapeutic properties. Ayurveda, the traditional Indian system of medicine, relies heavily on the use of spices for their health benefits, a tradition that has gained recognition worldwide.

In conclusion, the Spice Route played a crucial role in shaping global history, trade, and cultural interactions. Unlike the Silk Route, which lost its significance over time, the Spice Route remained relevant for centuries, influencing economies, explorations, and even colonial ambitions. The demand for spices drove maritime discoveries, impacted world politics, and laid the groundwork for modern globalization. The story of the Spice Route is not just about commerce but about human connections, innovations, and the enduring appeal of flavors that continue to shape the world.

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Printed at : St. Thomas Press, Pala, Ph: 9496613275