

While fixed term employment offers an ingenious way to address specific issues faced by both employers and employees, there are also some concerns associated with it. Discuss in Indian context.

Fixed term employment

changes the employer-employee relationship to temporary period based on amount of work.

The rise in digital and gig economy has increased fixed term employment in India.

Benefits

- Flexible. Not restricted to one occupation
- Easy to recruit - ease of doing business
- low-skilled and unskilled are employed for short time
(eg) Apprentices in automobile.
- Same wage as permanent employees based on amount of

work done.

However, there are certain challenges:-

↳ lack of social security benefits like maternity leave

↳ limited loan/credit prospects

↳ At places it is in informal sector: (even low wages) due to COVID induced stress

↳ Psychological burden of finding new job after period expires. Thus, low productivity.

↳ Against labour management and inclusion in firm's decision making.
(eg) No trade union of these employees

↳ limited ~~lack~~ of grievance redressal

(eg) Labour courts are not established

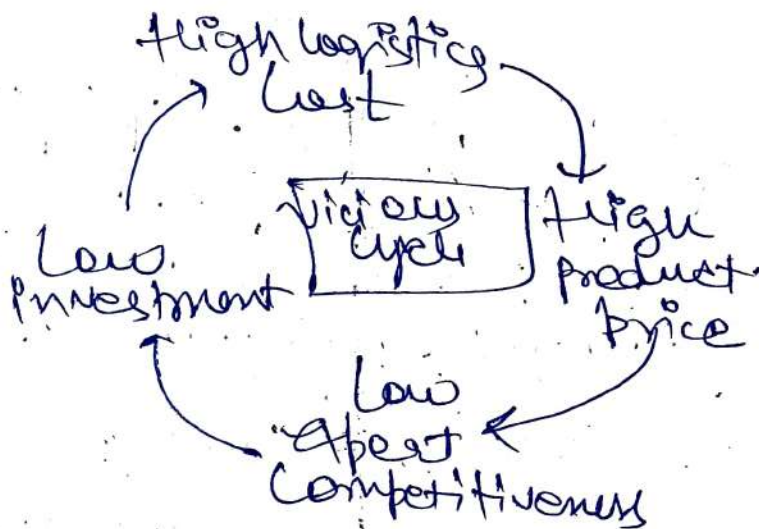
Thus, for A-41 and 42 (DPSP), worker's rights are crucial for SDG 8.

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Q An efficient logistics sector with a focus on warehousing is pivotal to the success of Bharatmala Pariyojana. Discuss

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In India, as per recent reports, the logistics cost is around 14-16% (Global average 8%)



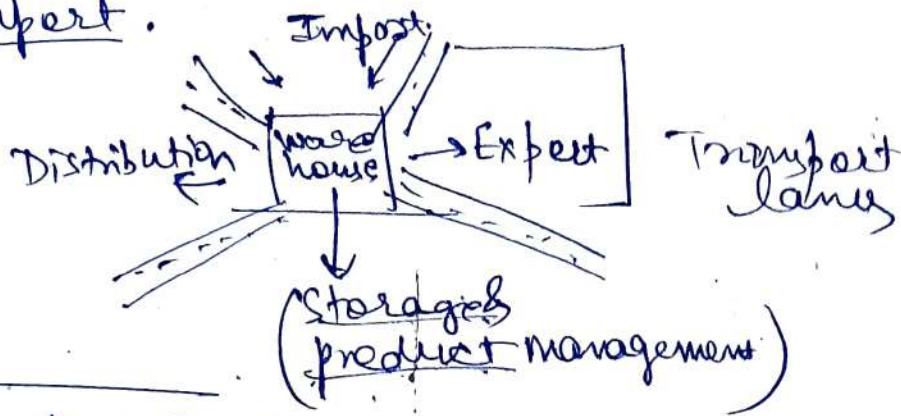
Bharatmala Pariyojana aims at improving transport infrastructure for logistics efficiency.

It aims at creating multimodal connectivity (Road, Rail).

Warehousing is crucial for acting

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as bridge between export and import.



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Pivotal role :-

- Economies of scale → Higher Profit
- Utilisation of wastelands
- Reduce regional disparity
(eg) Agri-warehouse in rural areas
- Reduce time & delay in clearance
- Reduce wastage due to calamities
- Digitally managed (eg) Beemivory start up & e-commerce

Thus, warehouse acts as 'hub' that channelise the flow of goods via storage and distribution. Its potential needs to be stapped for \$5 trillion economy.

Q. What do you mean by irrigation scheduling? Bring out the advantages provided by it, discuss the difficulties faced in applying it on a farm level.

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Irrigation scheduling refers to the timing management of irrigation based on low transpiration (Night) and low evaporation (Day).

Advantages

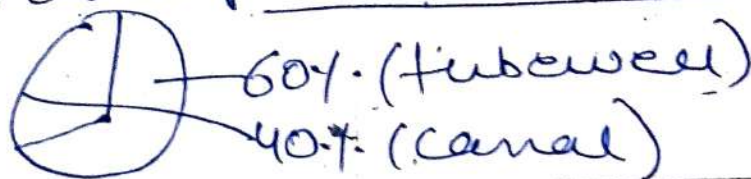
→ Water use efficiency by curbing water loss (@ daytime)



→ Based on cropping season and cycle of crop
 sow ————— harvest ————— reap

→ Prevent time poverty among farmers (Automation)

→ Prevents ground water loss



Difficulties

→ Small and fragmented holdings
dates use of expensive
technology

→ Data → local not one size
fits all approach.

(eg) Coastal - humid
Arid - dry

Lack of agro-ecology
farm based data

→ low awareness among
farmers

→ Extreme climatic events
are not avoided.

→ Based on internet connection
& cloud computing, but
low internet access
rural
(OFN - 20. f. rural)

The need of the hour is to
curb water loss (PM-KSY) by
dissemination of information (Kisan
Vigyan Kendras).

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4. While the Pradhan Mantri Fasal Bima Yojana was touted as the largest crop insurance scheme globally in terms of farmer participation, various concerns have arisen since its implementation. Discuss

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Pradhan Mantri Fasal Bima Yojana (PM-FBY) is a crop insurance scheme to prevent post-harvest loss due to unavoidable stress like hailstorm.

Benefits

- More than 50% of farmers has opted for the scheme.
- Major crops covered from food grain to horticulture.
- To encourage crop diversification by focusing of high value crops (eg) Fruits, vegetables
- Income security (Avg income - 10,000) → Prevent debt trap

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Concerns in implementation.

- ↳ High rate of interest for small and marginalised farmers
 - ↳ Exclusion of threats like bio-terrorism or locust attack
 - ↳ High pending claims
 - ↳ Regional disparity — states like Punjab & Haryana have been benefited
 - ↳ Commercial crops like oilseeds and coffee not remunerated
 - ↳ Bureaucratic apathy against poor & marginalised farmers.
 - ↳ No time bound settlement
 - ↳ limited grievance redressal
- Crop insurance acts as social security net for farmers which needs to be increased in breadth and depth for protecting "annadata" from financial stress.

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5. The Stockholm Convention commenced the contemporary environmental era, which brought a paradigm shift in the environmental governance and set a tone for multi-lateral environment regime.
discuss.

The 1972 Stockholm Convention was the watershed event for environmental consciousness based on Rachel Carson's Silent Spring induced warning for doomsday.

It has led to establishment of United Nations Environment Programme (UNEP) for global engagement.

Paradigm shift

i) COP → Conference of parties
↳ Multi-lateral climate engagements.

(eg) COP26 → Glasgow

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iii) In India, Jawahar Gandhi was pioneer in starting "Project Tiger" after the 1972 Convention

iii) later, it collaborated with WMO to form IPCC for data based policy making.

(IPCC 6th Assessment Report based on global warming)

iv) Role of historic polluters like US, UK (G7 - 70% contribution) was recognised & led to CBD (Common but differentiated responsibility)

But, there are certain limitations:

- Non-binding
- "All talk, no show"
- Polluter's pays not followed
- Limited climate finance
- west monopoly

In today's era of anthropocene, code red for humanity demands people, planet, prosperity as global paradigm

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6. The world has witnessed a huge surge in climate induced disasters which are largely driven by the anthropogenic factors. In this context, analyse the role of early warning systems in mitigating the impact of the disasters.

As per IPCC 6th Assessment Report, extreme climatic events are expected to rise.



Fig - Climate induced disaster

Anthropogenic factors -

1) Global warming - 0.2°C rise per decade.

- ii) Sea level rise — 3mm/yr
 due to glacial melting
- iii) GHG effect → heatwaves
- iv) Floods, drought, cyclone-
 disasters

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Role of Early Warning Systems (EWS)

- Predictive analytics
 (eg) Deep learning based study
- Fast dissemination of information
 (eg) Cyclone Gireh along Odisha coast
- Red Alert, by NDMA on social media handles for preparedness.
- Prevention of large scale damage to life & property
- Disaster risk reduction
- Buffer time for coping mechanism

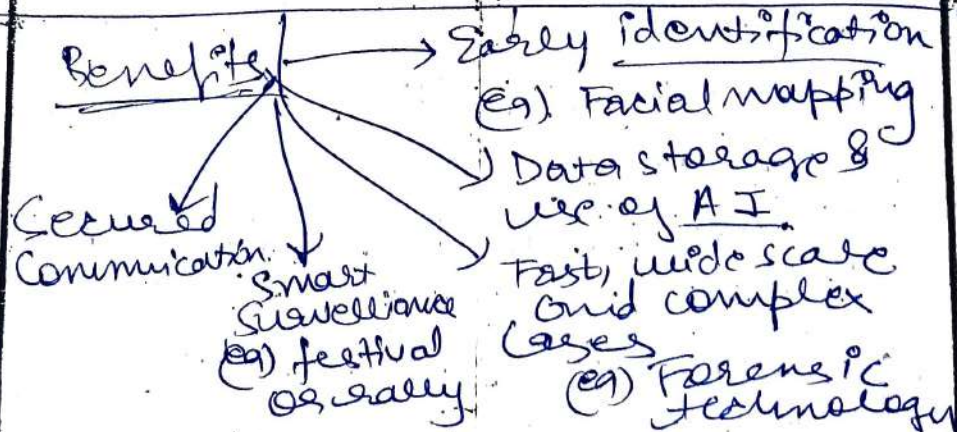
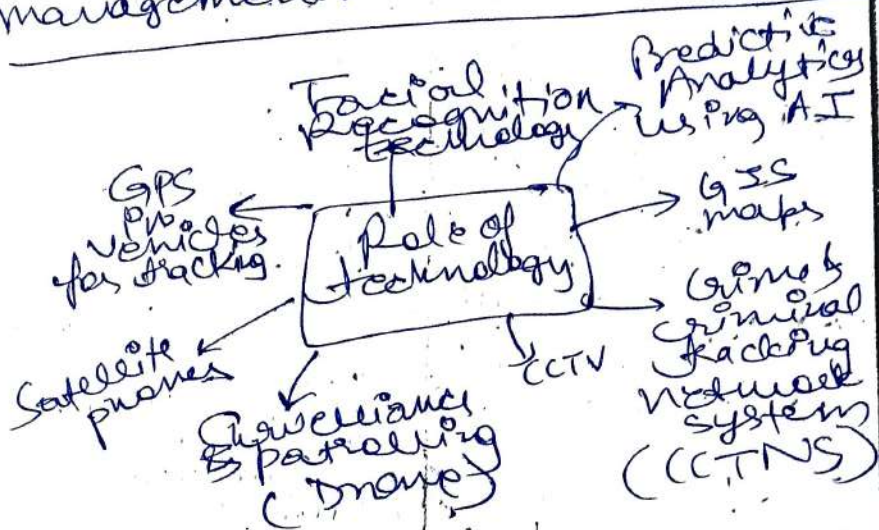
However, erratic events like cloudburst & lightning are not effective in EWS

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7. Critically examine the implementation of emerging technology in policing.

SMART Policing

(Strict, modern, accountable, responsible and tech-savvy)
is the call of new age threat management.



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Challenges

- BPRD - low financial capacity for policing activities
($> 30\%$ claims stalled)
- May breach privacy
 - (a) Criminal Identification Amendment Act 2022 - data storage of 75 years
- Bone to misuse due to criminal-bureaucratic-politician nexus
 - (a) Tracking opposition leader's activities
- data storage issues
- Cyber threats
 - DDOS attacks
 - espionage
 - Botnets
- Misuse of meta-data

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Way forward

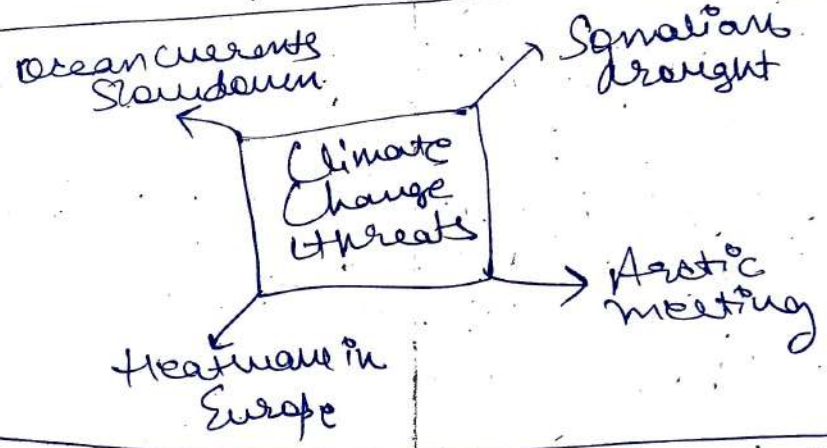
- ↳ BN Srikrishna Committee recommendation on privacy.
- ↳ Gopal Krishna Committee recommendation on use on personal & non-personal data
- ↳ Gulshan Rai Committee for cyber resilience for new age policing

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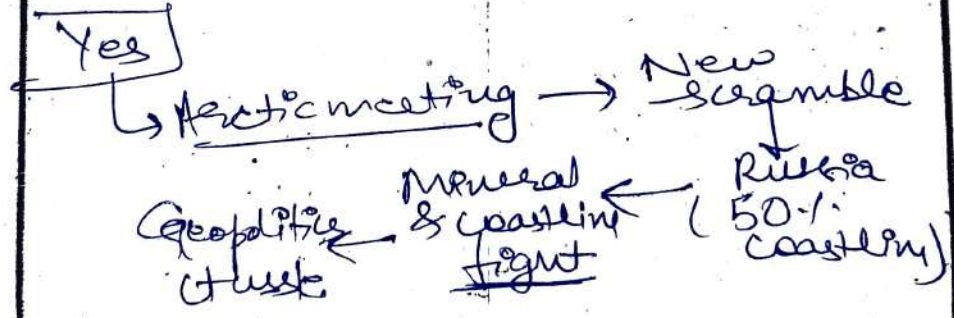
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8. How far do you agree with the view that climate change poses a threat to international peace and security.

Climate change is the existential threat for humanity as per UNSC Secretary General it is code red for humanity.



Threat to international peace and security!



↳ Horn of Africa hunger leads to eco-social crisis → instability

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↳ Disasters like cyclone - threat to critical information infrastructure

(eg) Fukushima nuclear blast due to tsunami

↳ Climate refugees (O.S vs T.H.M phenomena)

No

↳ China's recent claim to add climate change under UNSC jurisdiction was challenged by India.

↳ Regional effects particularly underdeveloped (eg) Mozambique, Kenya

↳ Not a security threat as it is environmental in nature with no common enemy

The way forward is global cooperation to tackle 3Cs - Conflict, Climate change & Coping mechanism

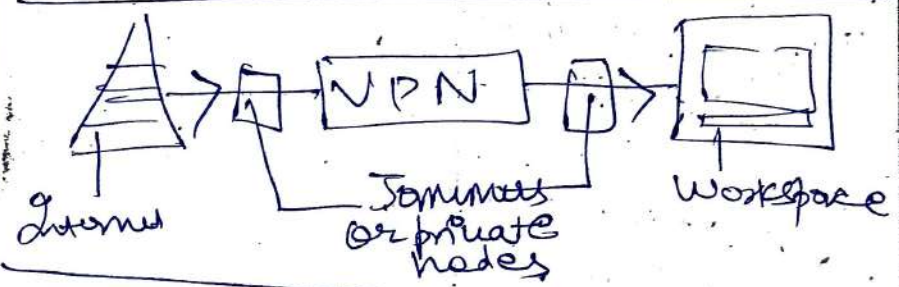
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9. What do you understand by a virtual private network? Highlight its advantages and discuss the concerns posed by it.

CERT in recent guidelines for changes in Virtual Private network (VPN) for National security has raised debates around the same.



→ VPN is a privately created secured space in digital and online economic space.

↳ It acts as "firewall" to prevent any data breach or hacking of critical information.

Advantages

↳ Case of doing business particularly

insufficient control. LIBERTAS
and SAS service.

↳ Personal identity security threats
like DDOS, botnet, hacking

↳ Retention of CII (critical information infrastructure)

Challenges / Concerns

↳ Against national security
& investigation scams

↳ data localisation is
not followed

↳ No third party audit
to curb any anti-national
or illegal activities

The recent guidelines provide
checks and balances (Data
Storage for 3 years etc.)

The recent
uses files case (kill switch)

offers warning & preventive steps
have been taken

10

The discovery of Higgs Boson at the Large Hadron Collider at CERN completed 10 years recently. In this context, discuss the role played by CERN in overall scientific development.

The Higgs boson particles are the subatomic particles that study matter and anti-matter.

Large Hadron Collider at CERN provides the necessary acceleration to particles for convergence.

Role played by CERN

- Study of universe origin
(a) Big bang theory
- Study of blackholes and research of outer space
- Energy and matter relationship

11. Highlighting the factors that affect the cropping pattern in India, discuss the need for modifying it in the context of the emerging agro-ecological concerns.

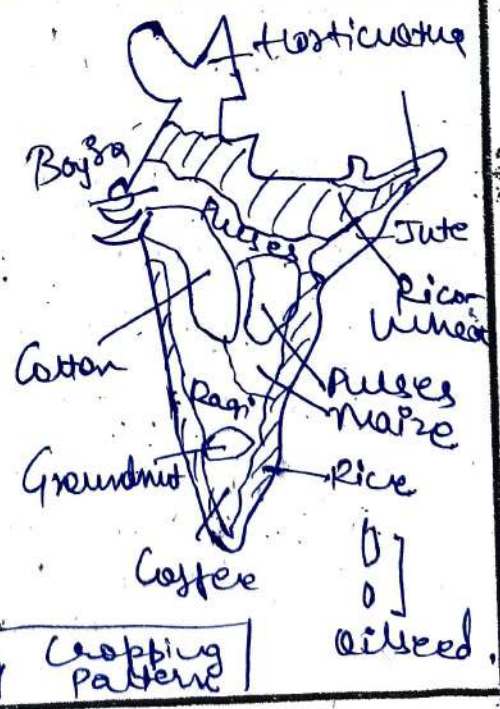
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As per the recent Agricultural Census, the cropping pattern has been distorted in favour of rice-wheat monoculture. The 165 million hectares of cultivable land, around 30% constitute food grains.

Factors affecting

i) Government policies

The M.S.P regime in favour of wheat procurement.



ii) Agro ecological factors

River
flooding plain
↑
high water
Rice

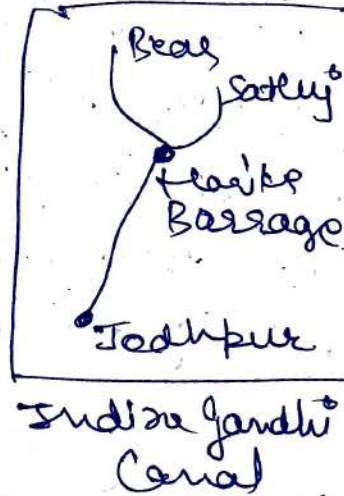
Black
soil
↑
Cotton

Semi
arid
millet
↑
Himalayas
↑
horticulture

iii) Availability of inputs - It

constitute the seed, irrigation,
fertiliser etc.

eg) Indira Gandhi
Canal in
Rajasthan has
used to ↑ rice
and wheat at
the cost of millets
& coarse grains



iv) Institutional factors like credit, land tenure, market (APMC), Kisan Vigyan Kendras (farmers' awareness) The market dictates the demand, thus supply.

eg) Rise in wheat in 2022
(export ↑ due to Russia -
Ukraine conflict)

However, It has created several issues such as - -

i) High NPK ratio

Ideal - 4:2:1
Actual - 6:8:4:2:1

ii) Flood irrigation → water inefficient

iii) micronutrient deficiency (eg) Phosphorus

Virtual water trade

iv) loss of soil fertility & organic content.

Need for modifying cropping pattern

i) Agroecology based cultivation
(eg) Bajra in Rajasthan, Paddy in Deccan plateau

ii) "Lab to land" - Agri research

iii) "Farmgate to fork" - Market driven high-remunerative prices.
(eg) organic farming (Export)

iv) Use of technology for input use efficiency eg Drones, AgriStack

Thus, it is crucial for Sustainable Agriculture, steps like PM-KSY, KVK, Agriculture export policy, Integrated agriculture parks are correct steps.

12. While the budgetary reforms undertaken by the Central government in recent years have led to better management of government expenditure, there are some issues that still need addressal. Discuss.

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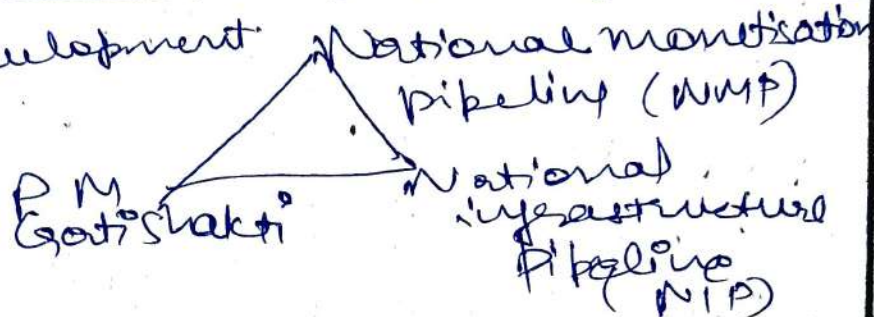
The budgetary reforms have led to efficient allocation of funds by the government.

- ↳ Merging of railway budget with general budget to curb populist measures.
- ↳ Finance Commission (A-280) guidelines in sharing net proceeds of taxes.
 - (eg) Family planning, forest area based development
- ↳ Central sector schemes allocation to state and Panchayats for A-38 (public welfare) (eg) PM-JAY, PM-FBYet.

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↳ Increase in health expenditure (1.5% of GDP) post COVID pandemic

↳ Increase in capital expenditure - 30 L crore (2022) for infrastructure development



↳ Steps to reduce expenditure burden. (eg) Atipath scheme (Pension, salary burden)

Issues

↳ low allocation to human health and education (3%) (1.5% of GDP).

As per Kasturirangan Committee it should be ↑ to 6% of GDP

↳ Also, curative > preventive health

↳ Low defence expenditure

India	-\$70bn
China	-\$250bn

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- ↳ Cess and surcharge not shared with states (Combative federalism)
- ↳ The GST compensation allocation to states will expire in 2022. BUT, states are demanding extension
- ↳ Populist measures (freebies) before election years.
- ↳ low expenditure on RND (0.67%)
- ↳ FRBM Act, laid targets are breached under flexible clause
- ↳ Unutilised budget for gender specific allocation (Nishchaya Juna)

Redressal

- multi-stakeholder feedback from experts
- More investment in Capex
 - (a) optical fibre network
- Bridge rural-urban disparity
 - (a) Bundelkhand Expressway
- Gender budgeting

Efficient and effective fund allocation will lead to \$5 trillion economy.

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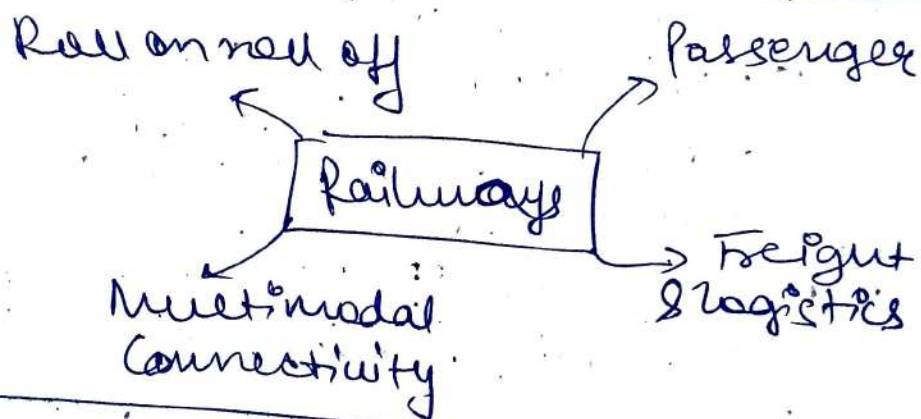
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13-

For India to create a future ready railway system, it must harness innovation and resource efficiency. Discuss the statement in context of the measures envisaged in the National Rail Plan 2030.

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India has 4th largest railway network in the world. 20 million passengers commute daily and provides 10L employment. Thus, railways are truly the growth engine of Indian economy.



Issues concerning railways:

- ↳ Operating ratio (₹98 spent for earning ₹100 — low profit)
- ↳ Safety & wildlife habitat fragmentation

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- ↳ Freight traffic delay
- ↳ Lack of terminal monetisation
- ↳ Operational inefficiencies
- ↳ Limited track advancement.

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Future
Ready
Railway

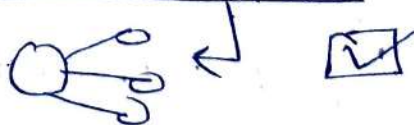
⇒ Harness Innovation.

- ↳ Data led policy making
(eg) Peak hour rush management
- ↳ Tourism circuits
- ↳ Non-fare revenue -
(eg) Terminal station
markets & shops
- ↳ Bibek Debroy → Liberalisation
- ↳ Pitroda committee → Modernisation
(eg) Monorail

⇒ Resource efficiency.

- ↳ Human resource - de-siloesation
for quick response
- ↳ Funds allocated to capital expenditure (eg) Vande Bharat Express
- ↳ Logistics - hub and spoke

○ ——— ○
Point to Point



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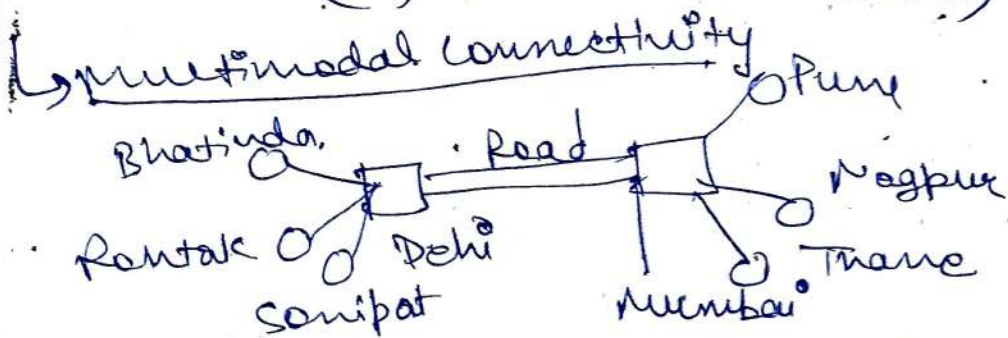
National Rail Plan 2030

↳ 100% track electrification by 2030

↳ increasing profits by public private partnership
(eg) Kochi metro

↳ Decongest high density urban areas, (eg) Aarey metro

↳ Railway safety - sensors, unmanned rail tracks
(eg) E-Kavach (Budget 2022)



↳ increase the share of freight traffic to decongest roads

↳ improve logistics cost for export competitiveness

Thus, PM-Gati Shakti and Dedicated freight corridor (DFC) are right steps for improving logistics efficiency → Economic growth.

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14.

Discuss the significance of technology in agriculture, sectors. Also, state other challenges in realising its potential to improve agricultural efficiency and increase the income of the farmers.

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Agriculture sector contributes around 12% to GDP but employs around 50% of population. Thus, provides huge scope for technology, innovation for SMART Agriculture.

Significance

↳ Biotechnology & Nanotechnology

- ↳ Nano fertilisers
(eg) Liquid urea
- ↳ Bioremediation to clean polluted farms
- ↳ GM crops
(eg) Bt Cotton for climate resilience

↳ Use of drone for agro-ecology based cultivation

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↳ use of sensors in irrigation channel based on humidity, temperature

↳ Blockchain for record management.

(eg) Fertiliser subsidy via blockchain

↳ Robotics for food preparation, tilling, sowing etc. will reduce "time poverty".

↳ Terrefaction technology for conversion of stubble & other agriwaste → Biogas

(eg) Takachar, new green scales

↳ Artificial intelligence for weather based inputs on cultivation

↳ India ← 17.1 population
2.4% land

Land scarcity

↳ Vertical farming

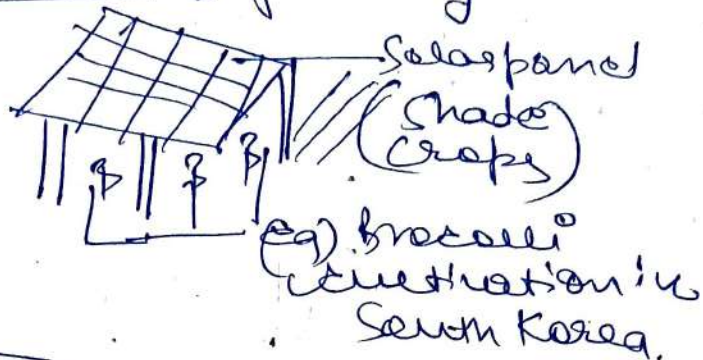
↳ Hydroponics

↳ Aeroponics

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↳ Agrovoltaics farming



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Challenges

↳ Small and fragmented land holdings (85% farmer have < 2 hectares of land)

↳ Low capital intensive technology

↳ Data privacy and cyber security threats

↳ Low awareness & digital literacy among farmers

↳ Energy intensive technology

Steps such as National Mission on sustainable agriculture (NMSA), NITI Aayog - Agri stack and Nano urea mission are right steps for 2X farmers' income (Salmai Committee)

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15

Discuss the digital transformation in the public distribution system (PDS) in India. Several challenges still remain. Elaborate. Also, suggest measures to address them.

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The public distribution system (PDS) has been the linkage between income and food security.

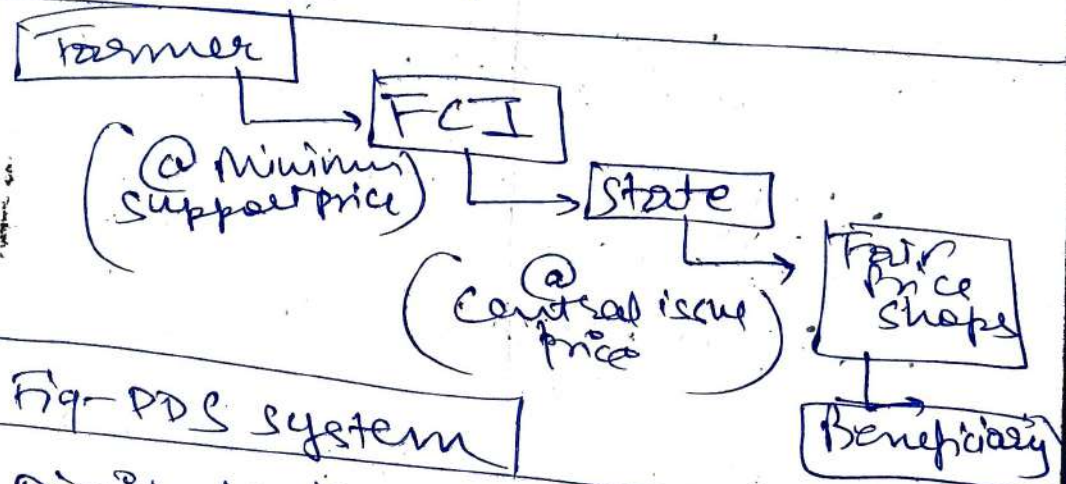


Fig- PDS system

Digital transformation!

- i) Biometric and linked ration card to curb leakages.
- ii) e-upajana system for MSP management.
- iii) e-NAM for pan India market accessibility.
- iv) Direct Benefit transfer (DBT)

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Impact

- Remunerative price to farmers
- Curb corruption
(eg) JAM Trinity
- Food security - PM-KSY in COVID
- Take home ration - to ease distribution

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Challenges

- Still, low awareness among farmers & BPL beneficiaries
- Buffer stock wastage and leakage
- Fraud Aadhar & duplication of records
- CAG Report - Data vault is prone to cyber attacks
- No regulation on use of personal and non-personal data.
- Regional disparity - Southern & north eastern states neglected
- Data privacy not regulated

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Measures

- Comprehensive legislations to curb cyber attacks (BN Srikrishna Committee)
- Use of non personal data (Gopal Krishna Committee)
- Bharatnet & optical fibre network to curb digital divide & internet accessibility
- Digital real-time supply chain management.
- NITI Aayog - SMART Agriculture Strategy for "ageipremure"

→ Thus, the need of the hour is: to inclusive, fair and equitable digital transformation in PDS.

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16 Discuss the various concerns that exist with regard to fuel efficiency regulations for vehicles in India. Also, suggest the measures that can be taken in this regard.

In India, there is high import dependence on fuels (85% crude oil & 50% gas imported). Upon this, fuel inefficiency increases the burden on government & people.

Concerns of fuel efficiency regulation.

↳ The ethanol blending programme targets (E20, E30) are not compatible with older vehicles.

↳ BS-VI norms for diesel vehicles not effectively enforced (high maintenance cost)

↳ High traffic in urban areas (Gurgaon, Noida, Bangalore)

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Leads to low mileage.

↳ low grade petroleum → low Calorific Value

↳ CNG leads to emissions and safety concerns

↳ State government - different regulation.

(e) Ban on 20 years old diesel vehicle only in Delhi-NCR

↳ due to difference in tax on ethanol and crude oil

↓
Less incentive on states to promote biofuel

↓
Low tax collection

Measures

→ Hybrid Vehicles - Automobile companies. tech-upgradation

→ Lowest price for efficient fuel to incentive customer

→ Infrastructure upgradation

(e) Industrial Corridor

(e) DFC

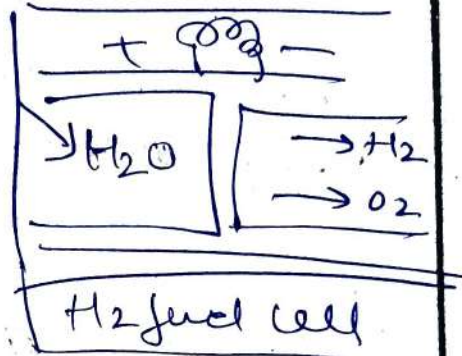
(e) Delhi-Vadodra Express

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↳ Promotion of 2G, 2.6, 13G biofuels powered vehicles.

↳ Hydrogen fuel cell as green alternative

↳ International collaboration
(eg) Germany technology



Thus, fuel efficiency forms part of economic growth and ecology for SDG.

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17. Urban fire is becoming a serious issue in Indian cities. fire is a major cause behind urban fires in India. What steps can be taken to build robust fire resilience in Indian cities.

Urban fires result from multiple factors but there is high vulnerability due to high population density:

(eg) Delhi — 11,200 persons per sq. km

In recent times, various instances like Mumbai, Surat urban fires have increased.

Major Causes

i) Industrial safety breached

(eg) Automobile, electronics industry, prone to fire

ii) Commercial spaces are densely built with no evacuation plan

(eg) Surat coaching region

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iii) landfill induced fire due to limited counter-measures while waste incineration.

iv) domino effect on nearby regions with flammable material.

v) vehicular fires are also common due to rising temperatures (eg. UK - 40°C in 2022)

vi) limited proactive measures by SDMA.

vii) Training, mock drills and evacuation plans are not shared with citizens. Also, low awareness.

viii) Safety - fire extinguisher, water fire emergency etc. are not followed.

ix) Unorganised sector of MSME lack skill & technology for tackle this crisis.

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Steps

NDMA guideline on urban fires :-

I) Pre-urban fire

- Hazard Mapping
(eg) Core, periphery regions of city
- Risk reduction strategy
- Early warning systems
(eg) sirens, fire sensor
- First aid kits

II) During-urban fire

- Rescue (eg) MDRF, SDRF dissemination
- Relief operations
- Rehabilitation
- Search in premises

III) Post

- Counter strategy
- Right to Compensation
(eg) Bhopal gas tragedy
- Retrofitting of buildings

Thus, Sendai framework is crucial for preparedness, planning and preparing for risk reduction

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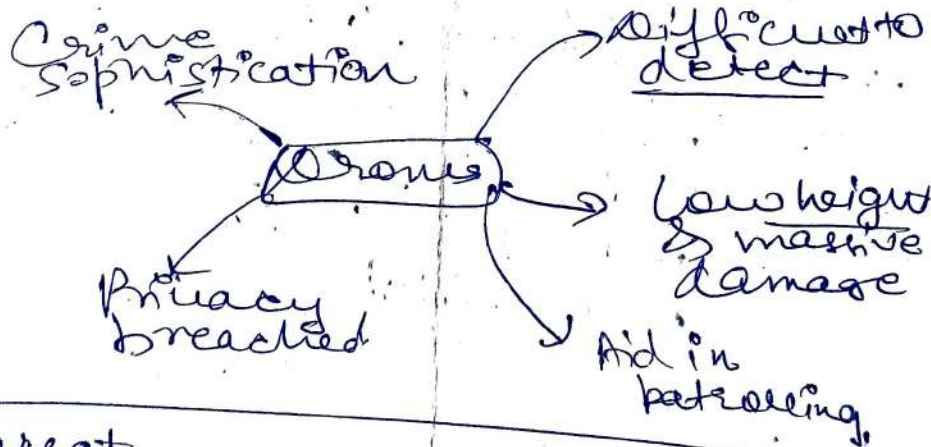
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18

Drones in border area present a serious threat for border management in India. Elaborate. Also, discuss the different measures taken to regulate use of drones in India.

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The recent drone attacks at Indo-Pak border provides security threat.



Threat

- Surveillance has become easy
- Tracking activities & monitoring (eg) China's bridge
- GPS spoofing
- Drone missile attack
- New warfare!

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- Illegal smuggling via drones
(e.g.) Drugs, arms,
Counterfeit currency
- Crime sophistication (e.g.) Disguised
drones

Measures taken

→ Anti-drone attacks against
Pakistan

→ domain awareness

→ Defence technology
upgradation

→ Startup boost

(e.g.) Bot lab Dynamics

→ EMS (Electromagnetic) and
GPS firewalls

→ Drone corridor (Prohibited)
Red



→ license based pilot certification

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- Drone certification (OCI)
based on weight
(eg) 250g - Nano Drone
- Relaxation for research
and startups in gaining
License to fly.
- draft drone policy from
comprehensive legislation.
- Only skilled, age (25yrs above)
and qualified pilot can fly
Drones -
(eg) Tumachal Drone
School for training

Drone has CAGR = 10%, with
\$200bn turnover by 2030.

Thus, its potential needs to
be tapped not just for
Smart surveillance but also
for economic and employment
growth.

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19. Despite a global framework to prevent weaponisation of space, it has been increasing in recent times. Discuss. ~~Give~~ Give an account of the impact.

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The open sky treaty has been globally agreed framework for preventing weaponisation of space.

The recent Russia-Ukraine conflict and cut off of internet & satellite access to Ukraine led to security issue.

Increasing in recent times

- Military aggressiveness in space (e.g) China
- Role of private sector and conflation of satellite
- Space: 5th dimension of warfare

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- Global monopoly of developed countries
(eg) Russia, US, Canada,
- Hyper nationalism in global commons capture
- Mineral prospects in space
to fuel energy & industrialisation
(eg) Asteroids & meteorites
- Lack of overarching institution
(like UN) to regulate activities in space
- Ineffective implementation of global treaty, no punishment in case of violation
- Satellite based attacks and threats
 - Earth observation
 - satellite communication
 - satellite navigation

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Impact

- Space debris
(eg) mission Shakti (ASAT) has launched around 200 million debris particles (NASA report)
- Lack of level playing field for small nations like Ukraine
- Increasing privatisation
(eg) Elon Musk's Starlink Jeff Bezos etc.
- Call for indigenisation to curb imports
(eg) NAVIC in India.
- Falling rockets, missiles parts on Earth → Physical damage

The need of the hour is to have institutional and policy framework to avert tragedy of commons (space - common Property resource)

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20.

What do you understand by a bio-economy? Highlight the role that the National Biotechnology Development Strategy 2021-25 can play in creating a robust bioeconomy in India.

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As per Bioeconomy report of India, it has been valued at 80 bn in 2022. It is expected to reach 300 bn by 2030.

Farmer's income

Use of Agri waste (straw, husk)

Bioeconomy

Value added products

Sustainable energy (Biofuel)

It includes conversion of biological products, and agri-waste (rotten potato, broken seeds) to value added products.

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National biotechnology development strategy, 2021-25

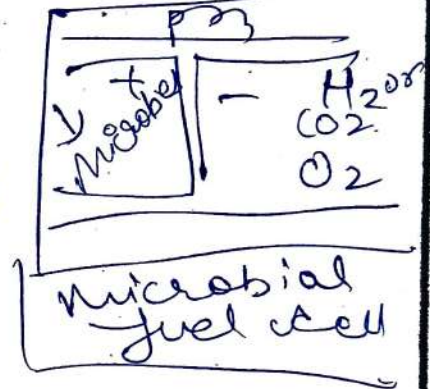
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↳ 3G biofuel production

It involves use of algae and genetically modified crops.

↳ Microbial fuel cell

↳ Bio-catalyst
(Nobel Prize 2021)
You fasten the decomposition



↳ Bio-molecules for waste management.

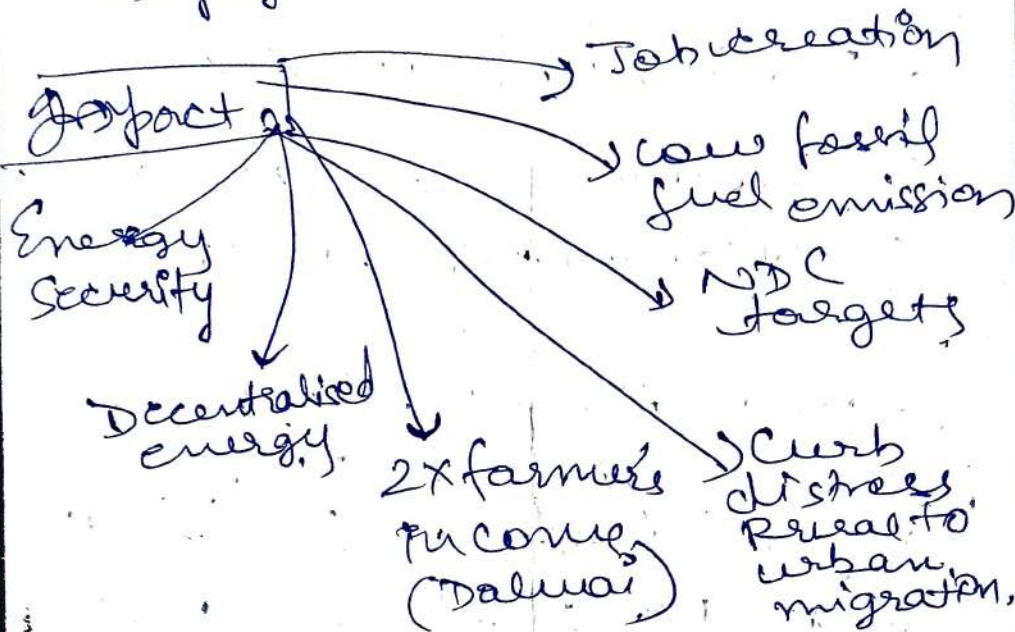
↳ Around 25% of food is wasted in India, biotechnology can be used for energy conversion.

↳ R&D and skills dissemination for human resource development.

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↳ BIRAC as institutional safeguard to regulate.

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Certain challenges

life supply, grain, & transport

issues,

(eg) used cooking oil (2G biofuel) difficult to collect & transport.

It has huge potential for energy independence! - PM Modi call for urja shakti & kisan's growth.