

**The Hindu Important News Articles & Editorial For UPSC CSE**

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**Edition: International | Table of Contents**

<b>Page 03</b> <b>Syllabus : प्रारंभिक तथ्य</b>	वर्षा जल संचयन कार्य से विशालकाय दफन स्थल का पता चला
<b>Page 04</b> <b>Syllabus : GS 3 : विज्ञान और प्रौद्योगिकी</b>	दूरबीन क्या है? आधुनिक दूरबीनें कितनी अच्छी हैं?
<b>Page 06</b> <b>Syllabus : प्रारंभिक तथ्य</b>	डेमचोक और देपसांग विवाद के समाधान में दो वर्षों में कोई प्रगति नहीं
<b>Page 07</b> <b>Syllabus : प्रारंभिक तथ्य</b>	रापा नूई जीनोम एक पुराने, परेशान लोगों के वास्तविक इतिहास को पुनर्स्थापित करता है
<b>Page 10</b> <b>Syllabus : GS 2 : अंतर्राष्ट्रीय संबंध</b>	चीन और रूस के बीच शक्ति विषमता
<b>Page 08 : संपादकीय विश्लेषण:</b> <b>Syllabus : GS 3 : भारतीय अर्थव्यवस्था - विकास और रोजगार से संबंधित मुद्दे।</b>	जनसांख्यिकीय लाभ, भारतीय अर्थव्यवस्था का मधुर पक्ष

केरल में कोडुवयूर ग्राम पंचायत द्वारा वर्षा जल संचयन परियोजना के कारण कुंडलिककड़ पहाड़ी पर कई मेगालिथिक कलश दफन की खोज हुई।

- ▶ पहाड़ी की चोटी के लिए असामान्य यह खोज केरल में मध्यपाषाण और लौह युग की अवधि के बारे में महत्वपूर्ण जानकारी प्रदान कर सकती है।
- ▶ पुरातत्वविद् डॉ. के. राजन इन दफन को समझने और सटीक रूप से तिथि निर्धारित करने के लिए आगे की खुदाई की आवश्यकता पर प्रकाश डालते हैं।

## Rain harvesting work reveals megalithic burial site

**Abdul Latheef Naha**  
PALAKKAD

A rainwater harvesting project, undertaken by the Koduvayur grama panchayat, led to an unusually large number of megalithic urn burials on top of a hill in the Kollengode range of Nenmara forest division in Kerala.

An archaeologist, who examined the urn burials found on Kundlikkad hill in Palakkad district said they could throw up a significant insight into the links between mesolithic and iron age periods in Kerala.

Kundlikkad would not have captured the attention of archaeologists had a group of labourers not dug up 60-odd pits on the hill as part of the panchayat's rainwater harvesting project.



A capstone found on top of an urn burial on Kundlikkad hill in Koduvayur panchayat in Palakkad district of Kerala. At right are the microliths recovered from the burial site.



"It is rare to find such exclusive urn burials on hilltops," said Dr. K. Rajan, archaeologist and professor of history at Government Victoria College, Palakkad. "The burials may go back to more than 2,500 years. But without

excavation, we cannot date it for sure," said Dr. Rajan, examining the microliths found from the site.

Dr. Rajan has been surveying the links between mesolithic and iron age periods in the State. "In most hill sites, what we see are

cairn heaps with cists and cairn circles and stone circles containing cists and dolmens. But on this hill, we could find an unusually large number of classic urn burials," he said, calling for deeper studies.

Several urns were bro-

ken as the labourers went at rain pits without being aware of the archaeological significance of the region. One of the urn burial has a capstone intact. Many pot sherds were found from the region indicating the presence of such pottery as black ware, red ware, and black and red ware. "The megalith builders had deposited huge urns having thickness between 8 mm and 2 cm," said Dr. Rajan.

The urn found in one of the pits had fingertip impressions on it. "The pot sherds of smaller pots bear cord impressed designs," said Dr. Rajan. "The chisel marks found on the rock at many locations of the hill indicate that the capstones and the circling boulder stones were made using chisels," he said.

### मेगालिथ क्या हैं?

- ▶ मेगालिथ प्रागैतिहासिक काल से एक बड़ी पत्थर की संरचना या स्मारक है, जिसका उपयोग अक्सर दफनाने या औपचारिक स्थलों में किया जाता है।
- ▶ आपको इसके बारे में सब कुछ जानना चाहिए
- ▶ मुख्य रूप से दक्कन के पठार, पूर्वोत्तर क्षेत्रों और दक्षिण भारत के कुछ हिस्सों में पाए जाने वाले इन स्मारकों में डोलमेन, केयर्न सर्कल और मेनहिर शामिल हैं।
- ▶ डोलमेन एक बड़े कैपस्टोन से ढके हुए सीधे पत्थरों से बने दफन कक्ष हैं।
- ▶ केयर्न सर्कल पत्थर की संरचनाएं हैं जिनका उपयोग कब्र के निशान के रूप में किया जाता है, जबकि मेनहिर लंबे, सीधे पत्थर होते हैं जिन्हें अक्सर पंक्तियों में रखा जाता है।

## Daily News Analysis

- कर्नाटक, तमिलनाडु और केरल जैसे मेगालिथिक स्थल प्राचीन दफन प्रथाओं, सामाजिक पदानुक्रम और औपचारिक गतिविधियों के बारे में जानकारी देते हैं।
- वे भारत की प्रारंभिक संस्कृतियों और पत्थर की तकनीक और सांप्रदायिक अनुष्ठानों में उनकी उन्नति को समझने के लिए महत्वपूर्ण हैं।



**Page 04 : GS 3 : Science and Technology**

लेख में दूरबीनों के प्रकारों, जिनमें अपवर्तक और परावर्तक मॉडल शामिल हैं, तथा उनकी विशेषताओं जैसे एपर्चर और स्पष्ट परिमाण, साथ ही पहाड़ों या अंतरिक्ष में दूरबीनों को स्थापित करने के लाभों के बारे में बताया गया है।

➔ इसमें हाल ही में हुई प्रगति जैसे कि अत्यंत बड़े टेलीस्कोप और जेम्स वेब स्पेस टेलीस्कोप पर प्रकाश डाला गया है।

# What is a telescope? How good are modern telescopes?

The modern telescope is a window into the universe, a sophisticated paintbrush in the hands of skilled astronomers that brings the fantastical wonders of the cosmos into view. And in so doing, telescopes give us an incomparable sense of our place and remind us of the joy of curiosity and exploration

SHRUTI WARMEDIA COMBONO



**The Aperture**

Let's consider the human eye. The opening size that regulates how much light may pass through an optical device is called the aperture. When the eye's pupil is fully dilated, its aperture area is around 333.3 sq. mm. To compare, a 0.07-m reflecting telescope — available as a toy — has an aperture area of 1324.4 sq. mm. This is 3.85 times more light-collecting area.

**Lenses**

While reflecting telescopes have replaced many refracting ones, lens instruments still use lenses, and their ability to refract light, for other purposes. For example, the telescope at the Vera C. Rubin Observatory uses three lenses to help sharpen images. One of these is among the largest of its kind in the world, with a diameter of 1.55 m.

**Reflectors**

In a reflecting telescope, rays reflected by the primary mirror are diverted to a secondary mirror, which reflects them into an eyepiece with a small lens to enhance the image. Alternatively, a hole is drilled in the primary mirror's centre, and the rays the primary reflects pass through this hole to the secondary, which reflects them into the eyepiece.



The LSST's 1.55-m corrector lens polished and coated with a broadband antireflective coating.

**Eyes on the sky**

Many telescopes (see below) have their own claims to fame. For example, the Large Synoptic Survey Telescope (LSST) — renamed the Vera C. Rubin Observatory — will use an 8.4-metre primary mirror to capture light from large patches of the night sky into the world's largest digital camera.

T.V. Venkateswaran

Celestial objects emit light in all directions. But only light rays travelling in the direction of the earth will reach us. And when these rays reach us after a lengthy journey, they are virtually parallel.

There are two ways to concentrate these rays and create an image. We can use a concave mirror to focus incoming photons at the focus point. The image produced by this reflecting telescope is real, inverted, and smaller. Most contemporary telescopes are such reflecting telescopes. Giant telescopes use parabolic mirrors because light rays reflected from the concave produce several focal points, causing the image to blur. See *Reflectors*.

Some telescopes also use lenses to bend light and directly create an image instead of using lenses. This is a refracting telescope. To observe fainter cosmic objects, much bigger lenses are required, which will slump under their own weight and distort the image. The maximum practicable lens size in a refracting telescope is around 1 m. The world's largest refracting telescope is at Yerkes Observatory in the U.S., with a 1.02-m lens.

**The primary function of telescopes**

It's a common misconception that telescopes are designed to make astronomical objects appear larger. Instead their primary function is to enhance the brightness of celestial objects, measured by their light-gathering power.

Say it's drizzling and you wish to collect rainwater. Place a cup with a small opening and a tub with a



larger opening outside. Due to the larger opening, the tub will collect more water than the cup in a given time.

This is what telescopes do with light. See *The Aperture*.

**Features of telescopes**

The brightness of celestial objects is quantified by their apparent magnitude. Its values are logarithmic, meaning each step represents 2.512 times more brightness than the earlier. For example, a star of magnitude 4.0 is 2.512 times brighter than a star of magnitude 5.0.

The lower the apparent magnitude, the brighter the object; the larger the magnitude, the dimmer it is. The sun's apparent magnitude on this scale is -26.78, Venus's is -4.92, and Sirius, the brightest star in the night sky, is -1.46. For more, see *Resolving the Andromeda*.

**Why are telescopes setup on mountains?**

The earth's tumultuous atmosphere interferes with the telescope's functioning. When starlight passes through the turbulence of air, it twinkles. Even the largest telescopes have a resolution of just 0.3-0.5 arcsec.

The higher we go, the less the air is disturbed, which is why most telescopes are erected atop mountains. Space telescopes are more than 400 km above sea level, allowing them to entirely escape atmospheric disturbances. That is why the



Hubble Space Telescope has a resolving power of around 0.04 arcsec, 10 times greater than the best ground-based telescopes.

A more enhanced version of this technology, called tomography, examines segments of the air column and eliminates aberrations to provide a crystal clear image.

**Limits to telescopes**

A telescope with a higher limiting magnitude is required to look deep into the universe, which demands a larger primary mirror. However, there is a limit to the size of the primary mirror.

Grab a sheet of newspaper. Hold it only at the edges and try to keep it horizontal. Because of its weight, the sheet will sag and droop. Now reduce the size of the sheet. If the sheet is large enough, it will still droop, but when it's small enough, it will be easy for you to hold it flat. Similarly, a mirror wider than around 8.5 m will sink under its own weight, distorting its surface. Astronomers have found a solution. See *Segmented Mirrors*.

**Segmented Mirrors**

Instead of a single primary mirror, today's large telescopes have many segments. Each piece is small enough to remain firm without slumping. And when they are combined, the overall light-collecting area is still large.



Hubble primary mirror JWST primary mirror

**Advanced telescopes around the world**

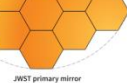
The largest telescope to date is the Large Binocular Telescope (LBT), which has two 8.4-m-wide mirrors and an effective combined aperture of 11.9 m. It is located at the Mount Graham International Observatory in Arizona, USA.

The Extremely Large Telescope (ELT) is under construction atop the Cerro Armazones in the Atacama Desert in Chile, as part of the European Southern Observatory. It is expected to be completed by 2028. See *ELT Specs for its aperture*.

Astronomers also increase the exposure time to better observe distant cosmic objects. Even a cup left in a drizzle for an extended duration will become full with rainwater. Similarly, by keeping the camera's shutter mounted to the telescope open for a protracted period, we may record dimmer light sources. Telescopes expose instruments called charge-coupled devices to light from target sources for many hours before combining them to generate a composite image.

The Subaru Telescope is an 8.2-m-wide Japanese telescope located at the Mauna Kea Observatory in Hawaii. It recently used 10 hours of exposure time to capture a faint celestial object with a visual magnitude of 27.7, which is 100-million-times fainter than what any human eye can detect.

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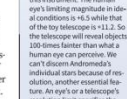


Hubble primary mirror JWST primary mirror

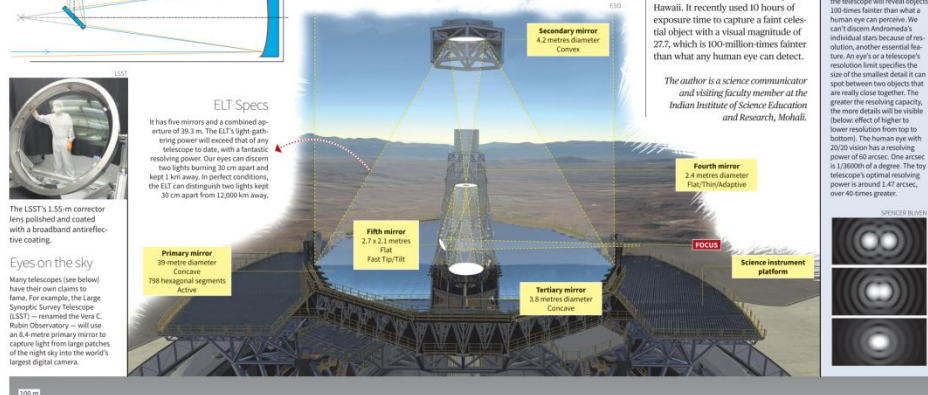
**Resolving the Andromeda**

The Andromeda Galaxy has trillions of stars and an apparent magnitude of 3.44. It's the farthest object we can see with our eyes. It appears as a fuzzy patch and we can't discern individual stars. The star  $\eta$  Car is 3,100,000 times brighter than the Sun. But because it is 13,000 lightyears away, it has an apparent magnitude of only +5.62. It's the faintest star visible to the naked eye. The limiting magnitude is the brightness of the faintest object visible to an optical instrument.

Anything fainter will be lost to this instrument. The human eye's limiting magnitude in ideal conditions is +6.5, while that of the eye telescope is +11.2. So the telescope will reveal objects 100-times fainter than what a human eye can perceive. We can't discern Andromeda's individual stars because of resolution, another essential feature. An eye's or a telescope's resolution limit specifies the size of the smallest detail it can spot between two objects that are really close together. The greater the resolving capacity, the more details will be visible (below: effect of higher to lower resolution from top to bottom). The human eye with 20/20 vision has a resolving power of 60 arcsec. One arcsec is 1/3600th of a degree. The eye telescope's optical resolving power is around 1.47 arcsec, over 40-times greater.



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- ➔ **दूरबीन क्या है?**
- ➔ दूरबीन एक उपकरण है जिसका उपयोग प्रकाश को एकत्रित करके दूर की वस्तुओं का निरीक्षण करने के लिए किया जाता है। यह छवियों को बड़ा करके और फीकी प्रकाश किरणों पर ध्यान केंद्रित करके खगोलीय चमत्कारों को प्रकट करता है।

## एपर्चर

- ▶ एपर्चर उस छिद्र को संदर्भित करता है जो प्रकाश को एकत्रित करता है। एक बड़ा एपर्चर अधिक प्रकाश को एकत्रित करने की अनुमति देता है, जिससे स्पष्ट और अधिक विस्तृत छवियां बनती हैं।

## लेंस बनाम परावर्तक

- ▶ अपवर्तक दूरबीन प्रकाश को मोड़ने के लिए लेंस का उपयोग करते हैं, इसे एक विशिष्ट बिंदु पर केंद्रित करते हैं।
- ▶ परावर्तक दूरबीन प्रकाश को एकत्रित करने और केंद्रित करने के लिए दर्पण का उपयोग करते हैं, जो अपवर्तक की तुलना में बेहतर स्पष्टता और कम विरूपण प्रदान करते हैं।

## दूरबीनों की विशेषताएँ

- ▶ आकाशीय पिंडों की चमक और दृश्यता स्पष्ट परिमाण पर निर्भर करती है, जो चमक के साथ विपरीत रूप से बढ़ती है (कम संख्याएँ अधिक चमकीली होती हैं)।
- ▶ उदाहरण के लिए, सिरियस सबसे चमकीला तारा है, जिसका परिमाण -1.46 है।

## पहाड़ों पर दूरबीनें क्यों स्थापित की जाती हैं?

- ▶ पर्वतीय वेधशालाएँ वायुमंडलीय विकृति को कम करने के कारण स्पष्ट आकाश प्रदान करती हैं।
- ▶ वायुमंडल के ऊपर अंतरिक्ष दूरबीनें और भी स्पष्ट दृश्य प्रदान करती हैं।

## उन्नत दूरबीनें

- ▶ चिली में स्थित एक्सटीमली लार्ज टेलीस्कोप (ELT) सबसे उन्नत दूरबीनों में से एक है, जिसमें उच्च-रिज़ॉल्यूशन वाली छवियों के लिए 39-मीटर का एपर्चर है।
- ▶ जेम्स वेब स्पेस टेलीस्कोप (JWST) प्रकाश को अधिक कुशलता से केंद्रित करने के लिए खंडित दर्पणों का उपयोग करता है, जो अवरक्त अवलोकनों के लिए महत्वपूर्ण है।

## टेलीस्कोप प्रौद्योगिकी में विकास

- ▶ आधुनिक दूरबीनें वायुमंडलीय अशांति को ठीक करने के लिए अनुकूली प्रकाशिकी का उपयोग करती हैं।
- ▶ हबल स्पेस टेलीस्कोप 0.04 आर्क सेकंड के रिज़ॉल्यूशन के साथ छवियों को कैप्चर करता है, जो गहरे अंतरिक्ष अन्वेषण में सहायता करता है।

भारत-चीन सीमा विवाद पर हाल ही में आए अपडेट से पता चलता है कि अधिकांश टकराव बिंदुओं पर महत्वपूर्ण विघटन हुआ है, लेकिन डेमचोक और देपसांग का मुद्दा अभी भी अनसुलझा है।

- ▶ यह मुद्दा प्रमुखता प्राप्त करता है क्योंकि नेता आगामी ब्रिक्स शिखर सम्मेलन की तैयारी कर रहे हैं, जो चल रहे सीमा तनाव को दर्शाता है।

## No progress in resolution of Demchok and Depsang friction points in 2 years

### NEWS ANALYSIS

**Dinakar Peri**  
NEW DELHI

There has been much hype over External Affairs Minister S. Jaishankar's comments that 75% of disengagement has been completed by India and China along the Line of Actual Control (LAC) in eastern Ladakh and the Chinese response that both sides have undertaken disengagement from four areas in the border areas.

However, the fact remains that both sides have undertaken mutually agreed and verified disengagement from five friction points while two more friction points, Demchok and Depsang, remain and there has been no progress towards their resolution in the past two years.

The widespread optimism, once again, of a possible breakthrough between the two countries in achieving further disengagement in the four-year-long stand-off, comes in the run-up to the BRICS (Brazil, Russia, India, China, and South Africa) Summit in October, which both



**No headway:** Last disengagement was a result of understanding reached during the 16th round of military talks in 2022. AFP

Prime Minister Narendra Modi and Chinese President Xi Jinping are scheduled to attend. This is akin to a similar situation last year before the BRICS Summit in August.

Speaking in Geneva on September 12, Mr. Jaishankar said "roughly" about "75% of disengagement problems are sorted out". "We still have some things to do," he said, adding that "there is a bigger issue that both of us have brought forces close up and in that sense, there is a militarisation of the border."

"There has been no change in the ground situation since the last disengagement two years back," a defence official noted.

Both sides have stated that after disengagement from the friction areas, they would undertake de-escalation, though the phrase "restoration of *status quo ante*" is being heard less and less. However, there is expectation of a possible disengagement from Demchok, though there is no clarity on any immediate Corps Commander-level talks.

### 'Generally stable'

Responding to questions on National Security Adviser Ajit Doval and Chinese Foreign Minister Wang Yi's meeting, Chinese Foreign Ministry Spokesperson Mao Ning, at a regular press conference on Sep-

tember 13, said, "In recent years, frontline armies of the two countries have realised disengagement from four areas in the western sector of the China-India border, including the Galwan Valley. The China-India border situation is generally stable and under control."

With disengagement undertaken from five of seven points, as stated by officials on several occasions, it is statistically around 71.5%, quite close to 75%, and also withdrawal of forces was acknowledged and verified on the ground, each time, by both sides.

Since the Corps commander-level talks in 2020, the two sides have so far undertaken disengagement from five friction points – from Galwan after the violent clash in June 2020, from the North and South Banks of Pangong Tso in February 2021, from Patrolling Point (PP) 17 in the Gogra-Hot Springs area in August 2021 and PP15 in September 2022. The last disengagement, from PP15, was a result of the understanding reached during the 16th round of Corps Commander-level military talks on July 17, 2022.

### समाचार का विश्लेषण:

- ▶ विदेश मंत्री एस. जयशंकर ने बताया कि भारत और चीन ने पूर्वी लद्दाख में वास्तविक नियंत्रण रेखा (LAC) पर 75% विघटन पूरा कर लिया है।
- ▶ चीन ने चार सीमा क्षेत्रों से विघटन को स्वीकार किया है, लेकिन दो घर्षण बिंदु, डेमचोक और देपसांग, अनसुलझे हैं।

### आपको जो कुछ भी जानना चाहिए

- ▶ पिछले दो वर्षों में इन दो बिंदुओं पर कोई प्रगति नहीं हुई है।
- ▶ चीनी विदेश मंत्रालय के प्रवक्ता माओ निंग ने स्थिति को "आम तौर पर स्थिर" बताया है।
- ▶ डेमचोक और देपसांग क्षेत्रों पर मुद्दे
- ▶ लद्दाख में डेमचोक और देपसांग क्षेत्र भारत और चीन के बीच विवादास्पद क्षेत्र रहे हैं।
- ▶ डेमचोक में, चीनी घुसपैठ और वास्तविक नियंत्रण रेखा (LAC) के पास बुनियादी ढांचे के निर्माण के कारण तनाव पैदा हुआ, जिसे भारत उत्तेजक मानता है।
- ▶ डेपसांग में, भारत द्वारा अपना क्षेत्र माने जाने वाले क्षेत्र में गश्त और सड़क निर्माण सहित चीन की गतिविधियों ने गतिरोध को जन्म दिया है।
- ▶ दोनों क्षेत्र वास्तविक नियंत्रण रेखा पर चल रहे विवादों और क्षेत्रीय सीमाओं के बारे में भिन्न धारणाओं को उजागर करते हैं।

रापा नुई जीनोम ईस्टर द्वीप के निवासियों के आनुवंशिक इतिहास और जनसंख्या गतिशीलता को प्रकट करते हैं।

- वे पारिस्थितिकी पतन के बारे में मिथकों को सही करने में मदद करते हैं, वास्तविक ऐतिहासिक जनसंख्या परिवर्तन दिखाते हैं, और द्वीप के इतिहास पर वंश और बाहरी प्रभावों के बारे में जानकारी प्रदान करते हैं।

## Rapa Nui genomes restore the real history of an old, troubled people

Studying Indigenous genomes offers invaluable insights into historical population dynamics, ecological adaptations, and the complex stories of human migration and survival. In many ways, the Rapa Nui genomes also show how genomic evidence can expose the derogatory myths that often surround Indigenous peoples

Sridhar Sivasubbu  
Vinod Scaria

**T**he volcanic island of Rapa Nui has long been shrouded in mystery. European sailors first arrived on its shores on Easter Sunday in 1722, giving it its colloquial name: Easter Island. It covers just 160 sq. km and is one of the most remote islands on the planet. Today, Rapa Nui is part of Polynesia and is officially a territory of Chile.

Early Polynesian explorers are believed to have traversed thousands of kilometres of open ocean to reach and settle the island, likely arriving centuries before the Europeans. The island's geography is harsh and challenging for humans. Its lava-covered terrain is rocky with limited freshwater sources, poor soil quality, and a low diversity of flora and fauna.

Despite these challenges, its first humans likely established a unique society in order to survive their exacting environs. However, the island's offerings would still have been quite finite, and ingenuity could only have taken the people so far. These realities gave rise to the widely held notion that the humans eventually overpopulated the island, resulting in ecological collapse and its people's demise.

But new evidence suggests this view may be fiction.

### Turning the gaze within

Rapa Nui is famous for its large statues called moai. They are shaped like large human heads and erected on stone pedestals. Some moai stand 40 feet tall and weigh 75 tonnes. They were carved in volcanic stone at quarries and then moved to their current locations across the island. Scholars believe the Rapa Nui built the moai between the 13th and the 16th centuries and represented their revered ancestors.

The statues all face inland, towards the people. Over 900 moai have been found on the island to date; more than half of them were transported across considerable distances from the quarries.

In his book 2004 *Collapse*, Jared Diamond proposed the population of Rapa Nui collapsed after overexploiting resources. The idea quickly found wide acceptance and became an example of the importance of sustainable living. But some scholars have called into question the feeble evidence to support the hypothesis.

### Protecting the soil

Scientists think the island's population had declined by around 1,600 before European explorers arrived in the 18th century. By then, the population was



The Ahu Tongariki stone platform on Rapa Nui with all its 15 moai, restored in the 1990s. BJØRN CHRISTIAN TORRISSEN (CC BY-SA 3.0)

estimated to be around 1,500-3,000.

Due to the limited availability of freshwater and the abundance of rocks, which limited widespread agriculture, the natives are believed to have burnt the palm vegetation to improve soil productivity.

They were also expected to have used rock gardening, a.k.a., lithic mulching: a way to protect soil moisture by regulating the temperature.

Either way, before the European settlers made contact with the Rapa Nui, the latter practised a limited agriculture to produce their food.

### A long-awaited census

In July, researchers from Columbia University, Arizona University, and Binghamton University, plus independent researchers from Rapa Nui, reported training an AI model to identify locations in satellite images of the island where its inhabitants practised rock-gardening.

The researchers estimated rock gardening was practised in less than 1 sq. km of the land, lower than previous estimates of 4-20 sq. km. Assuming the inhabitants exclusively cultivated sweet potatoes, the findings suggest they may have numbered fewer than 4,000 people.

Genetic studies have in the past provided unique insights into the histories of Indigenous and ancestral populations around the world. In 2014, *Current Biology* journal published a paper in which researchers analysed 27 genomes of the Rapa Nui people and concluded they had a considerable Native



Early Polynesian explorers are believed to have traversed thousands of kilometres of open ocean to reach and settle the island, likely arriving centuries before the Europeans

American ancestry, of around 8%. They also found the admixture with Native Americans happened before the 18th century. A significant European admixture followed when Europeans discovered and then colonised the island in the 18th century.

### Two catastrophes

In the event of an ecological collapse or a population bottleneck (when the genetic diversity of the population becomes so low as to become unable to withstand shocks like new diseases or disasters), the genomes would have been quite un-diverse in the population's descendants. Such "signals" could in turn provide insights into bottlenecks in the history of that population.

Members of the Rapa Nui community resisted an initial attempt by researchers to study their genomes. So a team led by Victor Moreno-Mayar at the University of Copenhagen turned to the remains of 15 Rapa Nui people secured at a museum in Paris. The remains were dated to have originated between 1670 and 1950 AD. The team extracted and sequenced DNA from tissue samples and reported their

findings on September 11 in *Nature*.

According to the study, the Rapa Nui population developed a bottleneck around 1300 AD – confirming a previous finding that highlighted the same date and, crucially, ruling out a population decline in around 1600 AD. Instead, the study suggested the population steadily grew until the European settlers arrived, followed by two catastrophic events: Chilean slave traders abducted more than a third of the population, and then there was a large outbreak of smallpox. The local population soon dwindled to one hundred or so individuals as a result.

### Restoring real histories

So there we have it: the pre-modern Rapa Nui didn't overexploit the resources of their small island. In fact, they may have been living responsibly, only to be decimated by the apathy of other peoples.

Studying indigenous genomes offers invaluable insights into historical population dynamics, ecological adaptations, and the complex stories of human migration and survival. In many ways, the Rapa Nui genomes also show how genomic evidence can expose the derogatory myths that often surround Indigenous people and give them their real histories back.

(The authors are senior consultants at Karkinos Healthcare and adjunct professors at IIT Kanpur and the D.Y. Patil Medical College, Pune. sridhar.sivasubbu@gmail.com, vinod.scaria@karkinos.in)

### THE GIST

In the book *Collapse*, it was proposed that the population collapsed after overexploiting resources. The idea found acceptance and became an example of the importance of sustainable living. But some scholars called into question the feeble evidence provided

According to a study, the Rapa Nui population grew until Europeans arrived, followed by two catastrophic events: Chilean slave traders abducted a third of the population, and then there was a smallpox outbreak. Numbers dwindled to one hundred or so

The study concludes that the pre-modern Rapa Nui didn't overexploit the resources of their small island. In fact, they may have been living responsibly, only to be decimated by the apathy of other peoples

रापा नुई क्या है?

- रापा नुई, जिन्हें ईस्टर द्वीप के लोग भी कहा जाता है, दक्षिण-पूर्वी प्रशांत महासागर में इस सुदूर द्वीप के मूल निवासी पोलिनेशियाई हैं।



- मोई नामक अपनी विशाल पत्थर की मूर्तियों के लिए प्रसिद्ध, उन्होंने एक जटिल समाज और संस्कृति विकसित की।
- रापा नुई के इतिहास में महत्वपूर्ण जनसंख्या वृद्धि और नाटकीय गिरावट की अवधि शामिल है, जो आंतरिक कारकों और यूरोपीय संपर्क से बाहरी प्रभावों दोनों से प्रभावित है।

### वे वास्तविक इतिहास को पुनर्स्थापित करने में कैसे मदद करते हैं

- जनसंख्या इतिहास को उजागर करें: जीनोमिक डेटा पिछली जनसंख्या के आकार और परिवर्तनों को प्रकट कर सकता है। उदाहरण के लिए, हाल के अध्ययनों से पता चलता है कि यूरोपीय संपर्क से पहले रापा नुई की आबादी पहले की तुलना में बड़ी और अधिक स्थिर थी।
- वंश और मिश्रण का खुलासा: जीनोमिक अध्ययनों से पता चलता है कि रापा नुई लोग मूल अमेरिकियों और यूरोपीय लोगों सहित अन्य आबादी से कैसे संबंधित हैं, जो ऐतिहासिक बातचीत और प्रवासन की एक स्पष्ट तस्वीर प्रदान करते हैं।

### नए अध्ययन के बारे में अधिक जानकारी

- रापा नुई (ईस्टर द्वीप) पर हाल ही में किए गए शोध ने इस विचार को चुनौती दी है कि संसाधनों के अत्यधिक दोहन के कारण उनकी आबादी में गिरावट आई।
- अध्ययन से पता चलता है कि रापा नुई की आबादी यूरोपीय संपर्क तक बढ़ती रही, जिसने दो बड़ी आपदाएँ पेश कीं: चिली के दास व्यापारियों द्वारा एक तिहाई आबादी का अपहरण और चेचक का विनाशकारी प्रकोप।
- निष्कर्षों से पता चलता है कि रापा नुई अपने संसाधनों का स्थायी रूप से प्रबंधन कर रहे थे और आंतरिक कुप्रबंधन के बजाय बाहरी कारकों ने उनकी गिरावट को जन्म दिया।

**Page 10 : GS 2 : International Relations**

रूस की चीन पर बढ़ती आर्थिक निर्भरता के कारण चीन-रूस के बीच गहराते रिश्ते ने मॉस्को की रणनीतिक स्वायत्तता बनाए रखने की क्षमता को लेकर चिंताएं बढ़ा दी हैं।

- ➔ यह शक्ति विषमता भारत के लिए चुनौतियां पेश करती है, क्योंकि चीन के साथ रूस का गठबंधन भू-राजनीतिक तनावों के बीच नई दिल्ली के लिए सुरक्षा साझेदार के रूप में उसकी विश्वसनीयता को बाधित कर सकता है।

**Power asymmetry between China and Russia**

As supplies from Moscow's traditional partners have dried up under sanctions and Russia's domestic capacity remains stretched, China has stepped up to help its friend. Compared to 2021, when high-priority goods from China accounted for 32% of Russia's import needs, China's share soared to 89% in 2023

**WORLD INSIGHT**

Amit Kumar

The Russian invasion of Ukraine in 2022 has brought about a major shift in the world order. Not only did it bring about a stronger trans-Atlantic alignment vis-a-vis Russia, but it has also pushed the latter closer to China. Consequently, strategists around the globe have been preoccupied with the repercussions of such a partnership between the two countries. The deepening Sino-Russian relationship has become a subject of discussion in India as well. The concern that one of India's most trusted partners now possibly shares an indispensable friendship with India's primary adversary has instigated debate around the reliability of Russia as a security partner. In this context, the most recurrent question that is being raised is: has Russia become a junior partner of China? The answer to the question will determine the autonomy that the Kremlin can exercise when it comes to choosing between Beijing and New Delhi.

Against the U.S.-led financial order The two countries have a shared grievance against the dual hegemony of the dollar and the SWIFT messaging system central to the current global financial system. Their perpetual tension with the U.S.-led geopolitical order of the West puts them in a vulnerable spot — the effects of which have become more pronounced lately.

Following Russia's invasion of Ukraine in 2022, the U.S. and its allies froze close to \$300 billion of Russia's forex reserves held overseas. China fears a similar threat in the event of a conflict with the West as around \$770 billion of China's \$3 trillion forex reserves are currently held in U.S. treasuries. Further, in 2024, the West imposed a SWIFT ban on Russian financial institutions involved in transactions of dual-use goods or weapons. The U.S. also threatened secondary sanctions on third-country financial institutions involved in such transactions with Russia. Fearing secondary SWIFT sanctions, Chinese financial institutions have withheld transactions worth tens of billions of yuan from Russia.

Thus, the two countries have a joint objective to reform (upend) the existing financial and economic order. The two have tried to promote de-dollarisation and alternative payment settlement systems, albeit without much success. Even as the two settled more than 90% of their bilateral trade in local currencies in 2023, this amounted to less than a percent of current account transactions globally. Renminbi-denominated transactions in settling trade amount to only around 6% of global transactions, which were otherwise dominated by the dollar, euro, pound and yen.

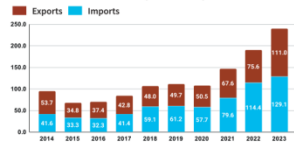
China's effort to promote the Cross-Border Interbank Payment System (CIPS) — its home-grown payment settlement system — is far from challenging SWIFT anytime soon, limiting its utility.

However, Russia's isolation from the Western-dominated global financial system makes its need for an alternative much more urgent. China's requirements aren't as urgent despite its grievances, as Beijing is still very much a part of the system. This essentially leaves Russia at China's mercy to set the pace for reforms. Furthermore, China alone has the diplomatic and monetary resources to mount a potential challenge to the

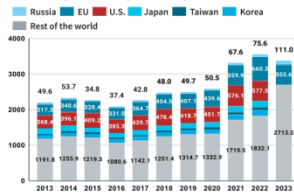
**A new power nexus?**

After the Russia-Ukraine war began, Russia has become completely dependent on China for its requirement of high-priority goods — a list of "50 dual-use products that are essential for manufacturing weaponry like missiles, drones, and tanks"

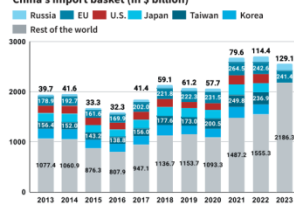
**China's trade with Russia (in \$ billion)**



**China's export basket (in \$ billion)**



**China's import basket (in \$ billion)**



Note: China did not release individual figures for all countries in 2023. Rest of World figures inclusive of the U.S., Japan, Taiwan, and Korea.

Source: Bank of Russia, National Bureau of Statistics (China), Ministry of Commerce, Eurostat, General Administration of Customs (China), CEIA

Western-dominated financial order. Russia's isolation and limited resources render it completely dependent on China to pull it out of its misery.

**Asymmetry in bilateral trade** At first glance, China-Russia trade appears symmetric over the years. In fact, Russia maintains a modest trade surplus over China. However, the asymmetry becomes apparent when their bilateral trade is put in the wider context of their respective overall trade.

In 2022, while exports to China made up for around 30.4% of Russia's total exports, Russia accounted for only 3% of China's total exports. While imports from China accounted for 36% of Russia's total imports in 2023, China's imports from Russia amounted to -5% of its total imports.

Secondly, more than 70% of Russia's exports to China were energy (fossil fuel) in 2022. In contrast, China's exports to Russia were relatively more diversified. This makes Russia's exports to China prone to shocks and uncertainties.

Thirdly, not only are Russia's exports to China dominated by energy, but a majority of Russia's global energy exports are also concentrated in China. This is

significant because the revenues from the energy sector have contributed between 30-50% of Russia's annual federal budget in the last 10 years. Moreover, the oil and gas sector contributes about 20% of Russia's GDP.

This renders the Kremlin's economy largely dependent on China. And lastly, Russia has lately become completely dependent on China for its requirement of high-priority goods — a list of "50 dual-use products that are essential for manufacturing weaponry like missiles, drones, and tanks." The war in Ukraine has significantly enhanced the importance of the metalworking industry, which is critical to producing machine tools necessary for arms manufacturing. As supplies from Moscow's traditional partners have dried up under sanctions and Russia's domestic capacity remains stretched, China has stepped up to help its friend. Compared to 2021, when high-priority goods from China accounted for 32% of Russia's import needs, China's share soared to 89% in 2023. Additionally, China's share in Russian imports of critical machine tools has increased from 28% in 2021 to 59% in 2022. In 2023, almost all of Russia's requirements were sourced from China.

In the process, over the last few years, China has completely dethroned the EU as Russia's primary trade partner. Moreover, it has absorbed majority of Russia's losses emanating from reduced trade with the EU. This has kept Moscow's trade figures largely stable despite stringent sanctions from the West. To sum up, China has emerged as Russia's most indispensable partner.

**What does it mean for India?** Despite all the goodwill that exists in the India-Russia relationship, the Kremlin's geopolitical goals align more closely with Beijing's than New Delhi's.

Further, trade between India and Russia constitutes only a minuscule percentage of the expanding China-Russia trade. The strategic alignment between China and Russia is too deep, and the asymmetry in their economic ties is too wide for Moscow to exercise any autonomy vis-a-vis India if it ever came down to choosing between New Delhi and Beijing. The question is no longer about Russia's willingness but its capability to resist China's pressure.

Amit Kumar is a Staff Research Analyst at Takshashila Institution. He tweets at [am\\_i\\_kumar](#).

**THE GIST**

China and Russia have a shared grievance against the dual hegemony of the dollar and the SWIFT messaging system central to the current global financial system.

Following Russia's invasion of Ukraine in 2022, the U.S. and its allies froze close to \$300 billion of Russia's forex reserves held overseas. China fears a similar threat in the event of a conflict with the West as around \$770 billion of China's \$3 trillion forex reserves are currently held in U.S. treasuries. Further, in 2024, the West imposed a SWIFT ban on Russian financial institutions involved in transactions of dual-use goods or weapons.

Despite all the goodwill that exists in the India-Russia relationship, the Kremlin's geopolitical goals align more closely with Beijing's than New Delhi's.

**रूस और चीन के बीच शक्ति विषमता:**

## Daily News Analysis

- ▶ चीन द्विपक्षीय व्यापार पर हावी है, रूस के कुल निर्यात में रूसी निर्यात 30.4% है, लेकिन चीन के निर्यात का केवल 3% है।
- ▶ रूस का चीन को निर्यात काफी हद तक ऊर्जा पर निर्भर है (70%), जबकि चीन का रूस को निर्यात अधिक विविध है।
- ▶ रूस की अर्थव्यवस्था ऊर्जा राजस्व पर बहुत अधिक निर्भर है, जो इसके संघीय बजट का 30-50% है।
- ▶ रूस महत्वपूर्ण उच्च प्राथमिकता वाले सामानों के लिए चीन पर निर्भर है, जिसमें हथियार निर्माण के लिए आवश्यक दोहरे उपयोग वाले उत्पाद शामिल हैं।
- ▶ पश्चिमी प्रतिबंधों से होने वाले नुकसान को अवशोषित करते हुए चीन ने यूरोपीय संघ की जगह रूस का शीर्ष व्यापार भागीदार बन गया है।
- ▶ रूस की चीन पर निर्भरता 2021 से बढ़ी है, जिससे मास्को बीजिंग के प्रभाव के प्रति अधिक संवेदनशील हो गया है।

### भारत के लिए इसका क्या मतलब है:

- ▶ रूस की चीन पर बढ़ती निर्भरता इसकी रणनीतिक स्वायत्तता को सीमित करती है, जिससे भारत के साथ संबंधों को संतुलित करने की इसकी क्षमता प्रभावित होती है।
- ▶ भारत-रूस व्यापार चीन-रूस व्यापार के विस्तार की तुलना में न्यूनतम है, जिससे मास्को के पास नई दिल्ली को प्राथमिकता देने का अधिकार कम हो गया है।
- ▶ जैसे-जैसे चीन-रूस संबंध प्रगाढ़ होते जा रहे हैं, रूस के भू-राजनीतिक लक्ष्य भारत की तुलना में चीन के साथ अधिक निकटता से जुड़ते जा रहे हैं।
- ▶ यह शक्ति विषमता भारत और चीन के बीच हितों के टकराव की स्थिति में चीनी दबाव का विरोध करने की रूस की क्षमता के बारे में चिंताएँ पैदा करती है।

# Demographic advantage, Indian economy's sweet spot

Much has been written about India's emergence as an economic giant – it is the world's fastest growing big economy, and is currently the fifth largest. Demographics is a major factor in propelling this rise given that the median age is around 28 years and 63% of the population is of working age. However, the labour force participation rate stood at 55.2% in 2022, according to a recent report released by the International Labour Organization (ILO), which goes on to state that falling labour intensity is likely due to growth being led by the services sector rather than manufacturing. Therefore, while we are certainly not experiencing “jobless growth”, more steps are needed to harness the demographic dividend.

## Continue with the reforms agenda

First and foremost, there is a need to press ahead with the ongoing reforms agenda to maintain, if not accelerate, India's growth trajectory as that by itself will create opportunities galore. There was a welcome reference to this in Finance Minister Nirmala Sitharaman's Budget speech to initiate and incentivise improvements in productivity and to facilitate markets and sectors to become more efficient. While there is much that the Centre has done to enhance ease of doing business, much of what needs to be done next, especially in the context of production, concerns the States (which is where the action is now). Hence, both need to walk in lockstep to broaden and deepen reforms.

The Economic Survey for 2023-24 states that technological advancements have led to a declining capital-to-output ratio and an increasing capital-to labour ratio. It was perhaps in this context that Arvind Panagariya, economist and Chairman of the 16th Finance Commission, while speaking at a recent event in the Federation Of Indian Chambers Of Commerce and Industry



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Gainfully employing a large, young and aspirational population is not easy but it is a challenge India can take on

said capital-led economic growth is not ideal as the country has an abundance of labour.

The reluctance of Micro, Small and Medium Enterprises, the backbone of employment, to grow in size and scale as well as that of large business houses to foray into labour-intensive sectors can be attributed to the compliance burden and costs imposed by outdated labour laws.

The impasse over implementing the new labour codes approved by Parliament is sending a wrong signal to existing and prospective investors alike. It is important that one or two States with an evolved manufacturing ecosystem break the logjam by taking the lead.

The Centre's efforts to give a boost to the manufacturing sector is generally viewed from the angle that it is untenable for 45% of the workforce to be employed in the agricultural sector which accounts for only 18% of GDP. While taking steps to enhance agricultural productivity, we must not forget those who are engaged in the unorganised and non-agricultural sectors – about 19% of the workforce – which are highly fragmented and suffer from low productivity.

It is important to address their aspirations by focusing on high-growth potential sectors such as toys, apparel, tourism, and logistics which are also labour intensive. Then, as skills get upgraded, there will be an opportunity to move up the value chain and provide even better and higher paying jobs.

## Skilling is a continuous process

Skilling is an important aspect of making future generations productive members of society. The Economic Survey highlighted that only 4.4% of the workforce in the age cohort of 15-29 years is formally skilled. This is a huge concern, and the dichotomy of labour surplus and skills shortage must be addressed through meaningful

public-private partnerships wherein industry plays an integral role in devising the curriculum and imparting 'on the job training'. Moreover, skilling is not a one-time intervention but a lifelong process which requires flexibility in institutional mechanisms as well as learning agility.

The emphasis of the New Education Policy (NEP) 2020 on foundational skills as well as higher order cognitive skills and critical thinking is a good step but, in a constantly changing world, the document must be reviewed periodically and updated.

## Impact of AI/ML

Finally, in an era of artificial intelligence (AI) and machine learning (ML), repetitive tasks with low skills are most at risk but there will always be a need for human intervention and oversight. While we must not underestimate the impact of AI/ML, neither should it be demonised. The key is to have appropriate regulations govern its use while harnessing what it has to offer. In addition to the opportunities offered by various emerging sectors, AI/ML itself is estimated by Statista to grow by nearly nine times to become a \$826.73 billion worldwide market by 2030. Further, according to NASSCOM, India already has the second largest talent pool globally in this field but the current gap between demand and supply is 51% which is projected to widen. Though very niche, it is an opportunity which should not be missed.

Gainfully employing a large, young and aspirational population is not easy but it is a far better challenge to have than dealing with an ageing one with its attendant economic and societal implications. India is in a sweet spot and must employ a holistic approach to create a talent pool so as to harness its demographic dividend for the benefit of the world at large.

**GS Paper 03 : भारतीय अर्थव्यवस्था - विकास और रोजगार से संबंधित मुद्दे।**

**PYQ: (UPSC CSE (M) GS-2 2021):** "भारत में जनसांख्यिकी लाभांश केवल सैद्धांतिक ही रहेगा जब तक कि हमारी जनशक्ति अधिक शिक्षित, जागरूक, कुशल और रचनात्मक नहीं हो जाती।" हमारी जनसंख्या की क्षमता को और अधिक उत्पादक और रोजगार योग्य बनाने के लिए सरकार द्वारा क्या उपाय किए गए हैं? (200 w /12.5 m)

**UPSC Mains Practice Question** श्रम सुधारों, कौशल पहलों और रोजगार पर एआई/एमएल जैसी तकनीकी प्रगति के प्रभाव पर ध्यान केंद्रित करते हुए भारत के जनसांख्यिकीय लाभांश द्वारा उत्पन्न चुनौतियों और अवसरों पर चर्चा करें। (250 w /15 m)

**संदर्भ :**

- ▶ भारत अपने जनसांख्यिकीय लाभ के कारण तीव्र आर्थिक विकास का अनुभव कर रहा है।
- ▶ हालाँकि, भारत को कम श्रम शक्ति भागीदारी, पुराने श्रम कानून और कुशल श्रमिकों की कमी जैसी चुनौतियों का सामना करना पड़ रहा है।
- ▶ सुधारों, बेहतर कौशल और श्रम-प्रधान क्षेत्रों को बढ़ावा देने के माध्यम से इन मुद्दों को संबोधित करना जनसांख्यिकीय लाभांश का पूरी तरह से दोहन करने और AI/ML उन्नति के सामने सतत विकास सुनिश्चित करने के लिए महत्वपूर्ण है।

**भारत का आर्थिक उदय और श्रम शक्ति गतिशीलता**

- ▶ भारत वर्तमान में दुनिया की सबसे तेजी से बढ़ती बड़ी अर्थव्यवस्था है और पाँचवीं सबसे बड़ी अर्थव्यवस्था है।
- ▶ देश का जनसांख्यिकीय लाभ इस वृद्धि में महत्वपूर्ण भूमिका निभाता है, जिसकी औसत आयु लगभग 28 वर्ष है और 63% आबादी कामकाजी आयु की है।
- ▶ हालाँकि, अंतर्राष्ट्रीय श्रम संगठन (ILO) के अनुसार, 2022 में भारत की श्रम शक्ति भागीदारी दर 55.2% थी।
- ▶ विनिर्माण के बजाय सेवा क्षेत्र द्वारा संचालित विकास के परिणामस्वरूप श्रम तीव्रता कम हुई है।
- ▶ हालाँकि भारत "बेरोज़गारी रहित वृद्धि" का अनुभव नहीं कर रहा है, लेकिन इसके जनसांख्यिकीय लाभांश का दोहन करने के लिए और अधिक प्रयासों की आवश्यकता है।

**विकास को बनाए रखने के लिए सुधारों की आवश्यकता**

- ▶ भारत के विकास पथ को बनाए रखने या तेज करने के लिए, ऐसे सुधारों को जारी रखना महत्वपूर्ण है जो नए अवसर पैदा करते हैं।
- ▶ कारोबार को आसान बनाने के केंद्र के प्रयासों के बावजूद, कई आवश्यक सुधार, विशेष रूप से उत्पादन के संदर्भ में, राज्यों की ओर से आने चाहिए।
- ▶ केंद्र और राज्यों दोनों को यह सुनिश्चित करने के लिए सहयोग करने की आवश्यकता है कि सुधारों को व्यापक और गहन बनाया जाए।

**पूंजी-आधारित विकास और श्रम-गहन क्षेत्र**

- ▶ तकनीकी प्रगति के कारण पूंजी-से-उत्पादन अनुपात में कमी आई है, जबकि पूंजी-से-श्रम अनुपात में वृद्धि हुई है।

- अर्थशास्त्री अरविंद पनगढ़िया ने श्रम-आधारित आर्थिक विकास की आवश्यकता पर प्रकाश डाला, क्योंकि भारत में श्रम की प्रचुर आपूर्ति है।
- सूक्ष्म, लघु और मध्यम उद्यम (MSME), जो रोजगार की रीढ़ हैं, पुराने श्रम कानूनों के बोझ के कारण आकार में वृद्धि करने में अनिच्छुक हैं।
- नए श्रम संहिताओं को लागू करने में देरी निवेशकों को नकारात्मक संकेत भेजती है, और विकसित विनिर्माण पारिस्थितिकी तंत्र वाले राज्यों को इस गतिरोध को तोड़ने में अग्रणी भूमिका निभानी चाहिए।

### उच्च-विकास और श्रम-प्रधान क्षेत्रों पर ध्यान केन्द्रित करना

- केंद्र का विनिर्माण पर ध्यान आंशिक रूप से कृषि से श्रमिकों को हटाने की आवश्यकता से प्रेरित है, जो 45% कार्यबल को रोजगार देता है, लेकिन सकल घरेलू उत्पाद में केवल 18% का योगदान देता है।
- कृषि उत्पादकता में सुधार के अलावा, असंगठित और गैर-कृषि क्षेत्रों पर भी ध्यान दिया जाना चाहिए, जो 19% कार्यबल को रोजगार देते हैं, लेकिन कम उत्पादकता से ग्रस्त हैं।
- खिलौने, परिधान, पर्यटन और रसद जैसे उच्च-विकास क्षमता वाले क्षेत्रों, जो श्रम-प्रधान हैं, को प्राथमिकता दी जानी चाहिए।
- जैसे-जैसे कौशल में सुधार होगा, श्रमिकों के लिए मूल्य श्रृंखला में आगे बढ़ने और बेहतर वेतन वाली नौकरियां हासिल करने के अवसर होंगे।

### कार्यबल को कुशल बनाने का महत्व

- भविष्य की पीढ़ियों को समाज के उत्पादक सदस्य बनाने के लिए कौशल प्रदान करना महत्वपूर्ण है।
- 15-29 आयु वर्ग में केवल 4.4% कार्यबल औपचारिक रूप से कुशल है, जो एक बड़ी चिंता है।
- श्रम अधिशेष और कौशल की कमी को सार्वजनिक-निजी भागीदारी के माध्यम से संबोधित किया जाना चाहिए, जहां उद्योग पाठ्यक्रम विकसित करने और नौकरी पर प्रशिक्षण प्रदान करने में भूमिका निभाते हैं।
- कौशल विकास एक आजीवन प्रक्रिया होनी चाहिए, तथा निरंतर सीखने को सुनिश्चित करने के लिए संस्थागत तंत्र में लचीलापन आवश्यक है।

### आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग का प्रभाव

- आर्टिफिशियल इंटेलिजेंस (AI) और मशीन लर्निंग (ML) के उदय के कारण दोहराव वाली, कम कुशल नौकरियाँ जोखिम में हैं, लेकिन मानवीय हस्तक्षेप की हमेशा आवश्यकता रहेगी।
- AI/ML बाजार में उल्लेखनीय वृद्धि होने की उम्मीद है, जो 2030 तक वैश्विक स्तर पर \$826.73 बिलियन तक पहुँच जाएगा।
- भारत में AI/ML में दूसरा सबसे बड़ा प्रतिभा पूल है, लेकिन आपूर्ति और माँग के बीच 51% का अंतर है, एक ऐसा अंतर जिसके और बढ़ने की उम्मीद है।
- भारत को वैश्विक बाजार में प्रतिस्पर्धी बने रहने के लिए इस अवसर का लाभ उठाना चाहिए।

### निष्कर्ष

- भारत की बड़ी, युवा आबादी को लाभकारी रूप से रोजगार देना चुनौतीपूर्ण है, लेकिन वृद्ध होती आबादी से निपटने की तुलना में यह अधिक फायदेमंद है।
- कुशल प्रतिभा पूल बनाने के लिए एक समग्र दृष्टिकोण की आवश्यकता है, जिससे भारत अपने जनसांख्यिकीय लाभांश का दोहन कर सके और वैश्विक अर्थव्यवस्था में योगदान दे सके।