Infomerics Analytics & Research

CIN: U74999DL2020PTC369018

Flat No.108, Golf Apartments, Sujan Singh Park New Delhi – 110 003
iar@infomerics.com, Phone: +9111 41410243, 4141 0244,

Report On (**Drone based**) Geospatial Industry

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1.Global Macro-Economic Scenario

The global economy is projected to experience a deceleration in growth, with global GDP expanding by 2.8% in CY 2025, down from 3.3% in CY 2024. This slowdown is attributed to escalating trade tensions, particularly due to new U.S. tariffs, and heightened policy uncertainties. Global headline inflation is expected to decline to 4.3% in CY 2025 and further to 3.6% in CY 2026, as inflationary pressures ease across advanced economies, aided by tighter monetary policy, improved labour market conditions, and the resolution of supply disruptions. However, global trade growth is forecasted to slow significantly to 1.7% in CY 2025, reflecting the effects of escalating trade barriers and geopolitical instability.

In China, economic prospects remain constrained as the IMF downgraded its CY 2025 GDP growth forecast to 4.0%, due to persistent challenges in the real estate sector, weak consumer demand, and trade-related pressures. In Europe, growth is expected to stagnate, with Germany's GDP forecast at 0.0% in CY 2025, amidst trade disruptions and domestic weaknesses. The EU is actively seeking to address these challenges through renewed trade dialogue with the U.S.

Meanwhile, India continues to show resilience, with the IMF projecting stable real GDP growth of 6.2% in CY 2025, followed by a slight uptick to 6.3% in CY 2026. This is supported by robust rural consumption and sustained infrastructure investment. The IMF notes that India remains one of the fastest-growing major economies, driven by favourable demographics, expanding digital infrastructure, and rising investment activity. Consumer price inflation in India is projected to moderate to 4.2% in CY 2025, staying within the Reserve Bank of India's (RBI) target range of 2–6%, which helps maintain purchasing power and economic stability. The IMF also highlights the importance of continued structural reforms in India, particularly in labour markets, logistics, and capital formation, to sustain medium-term growth momentum.

Overall, while inflation is declining globally, the economic outlook remains clouded by geopolitical uncertainty, trade fragmentation, and region-specific structural challenges. However, India's relative macroeconomic stability, demographic advantage, and ongoing investment cycle place it in a strong position amid global headwinds.

1.1 Global GDP Growth Scenario

The global economy began to recover from its lowest levels following the lifting of lockdowns in 2020 and 2021. The pandemic-induced lockdown was a key factor that severely disrupted economic activities, leading to a recession in CY 2020, where global GDP contracted by -2.7%.

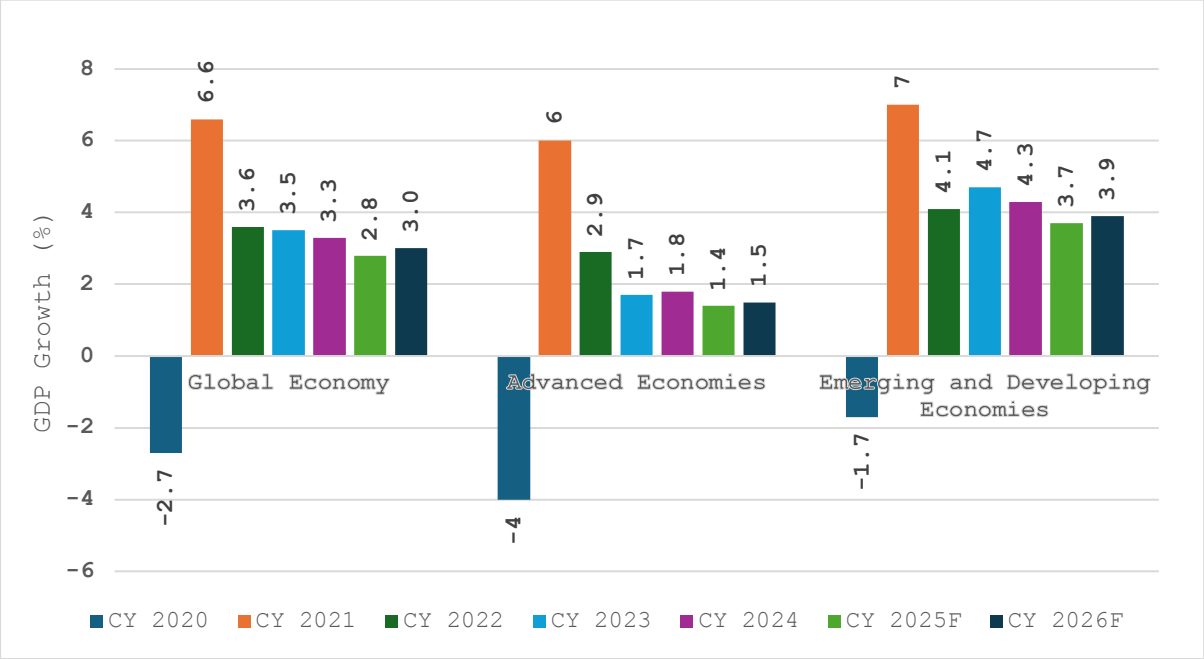
In CY 2021, supply chain disruptions significantly impacted both advanced economies and low-income developing economies. The rapid spread of the Delta variant and the threat of new variants in mid-2021 further heightened uncertainty in the global economic environment.

Global economic activity saw a sharper-than-expected slowdown in CY 2022. The highest inflation in decades, observed in 2022, forced most central banks to tighten their monetary & fiscal policies. Russia's invasion of Ukraine exacerbated global food supply issues, further increasing the cost of living.

Despite initial resilience in early CY 2023, marked by a rebound from the pandemic and progress in curbing inflation from the previous year's highs, the situation remained precarious. Economic activity continued to lag its pre-pandemic trajectory, especially in emerging markets and developing economies, leading to widening regional disparities. Several factors impeded recovery, including the lasting impacts of the pandemic, geopolitical tensions, tightening monetary policies to combat inflation, reductions in fiscal support amid high debt levels, and extreme weather conditions. As a result, global growth slowed from 3.6% in CY 2022 to 3.5% in CY 2023.

The global economy maintained moderate momentum in CY 2024, with real GDP growth estimated at 3.3%, supported by easing inflationary pressures, recovering supply chains, and resilient consumer demand in some major economies. Advanced economies, particularly the U.S., benefitted from strong labour markets and improved private consumption. However, growth remained uneven across regions, with emerging markets facing tighter financial conditions and subdued export demand. Inflation declined faster than anticipated in many regions, enabling some central banks to consider gradual monetary easing by the end of the year.

1.2 Historical GDP Growth Trends



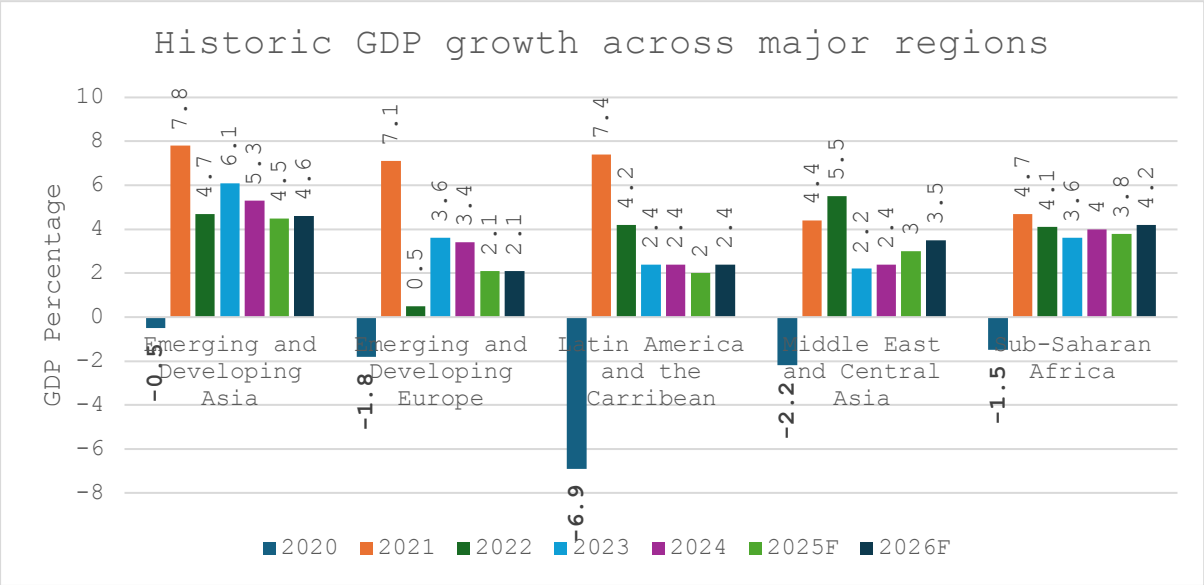
F – Forecast, Source – IMF World Economic Outlook April 2025

Note: Advanced Economies and Emerging & Developing Economies are as per the classification of the World Economic Outlook (WEO). This classification is not based on strict criteria, economic or otherwise, and it has evolved over time. It comprises of 40 countries under the Advanced Economies including the G7 (the United States, Japan, Germany, France, Italy, the United Kingdom, and Canada) and selected countries from the Euro Zone (Germany, Italy, France etc.). The group of emerging market and developing economies (156) includes all those that are not classified as Advanced Economies (India, China, Brazil, Malaysia etc.)

In the current scenario, global GDP growth is projected to decelerate to 2.8% in CY 2025, reflecting mounting economic pressures across both advanced and emerging markets. This marks a significant slowdown driven by intensifying trade fragmentation, the impact of new U.S. tariffs, and elevated geopolitical tensions. Structural weaknesses such as the ongoing real estate crisis in China, stagnant growth in the Eurozone, and tight financial conditions in major economies are expected to weigh heavily on global output. Additionally, stress in housing and banking sectors, coupled with subdued industrial activity, is contributing to a muted growth outlook. On the inflation front, the IMF projects global headline inflation to decline to 4.3% in CY 2025, continuing a disinflationary trend as energy prices stabilize and supply-side disruptions ease. The softening of labour markets—reflected in lower job vacancy rates and modest increases in unemployment—is also expected to help reduce core inflation. This provides room for some central banks to initiate cautious interest rate cuts, although the broader economic outlook remains uncertain due to persistent global risks.

1.3 GDP Growth Across Major Regions

GDP growth across major global regions—including Europe, Latin America & the Caribbean, Middle East & Central Asia, and Sub-Saharan Africa—continues to display varied trajectories. While some regions are stabilizing post-pandemic, others remain challenged by structural and cyclical issues. The global outlook presents a mixed scenario, with emerging economies continuing to outperform advanced economies.



Source-IMF World Economic Outlook April 2025 update.

In Emerging and Developing Asia, growth is projected to moderate from 5.3% in CY 2024 to 4.5% in CY 2025, before recovering slightly to 4.6% in CY 2026. India is expected to grow at 6.2% in CY 2025, supported by resilient rural consumption and sustained infrastructure investments, though lower than 6.5% growth recorded in CY 2024. In contrast, China's growth is likely to decelerate to 4.0% in CY 2025, amid persistent real estate concerns and weak domestic demand.

Sub-Saharan Africa is projected to grow at 3.8% in CY 2025, slightly below the 4.0% growth in CY 2024, with a further improvement to 4.2% in CY 2026. The recovery is being aided by improved weather conditions and better functioning supply chains.

In the Middle East and Central Asia, the economy is forecasted to expand at 3.0% in CY 2025, up from 2.4% in CY 2024, and further strengthen to 3.5% in CY 2026, driven by stabilization in oil production and ongoing economic reforms.

For Latin America and the Caribbean, modest growth of 2.0% is forecast for CY 2025, holding steady from CY 2024, with expectations of a rebound to 2.4% in CY 2026, helped by stronger macroeconomic management across key economies.

Emerging and Developing Europe remains subdued, with growth estimated at 2.1% in CY 2025, down from 3.4% in CY 2024, expected to be stable at 2.1% by CY 2026. The region continues to face structural manufacturing challenges, particularly in major economies like Germany.

Overall, while global growth is expected to remain steady, regional disparities persist, influenced by a combination of domestic challenges, external geopolitical tensions, and fluctuating commodity prices.

1.4 Global Economic Outlook

At the midpoint of the year, so far in 2025 the global economy continues to exhibit mixed performance, with divergence in outcomes across regions due to differences in economic growth, inflation dynamics, and policy responses. The global GDP growth is projected at 2.8% in CY 2025, down from an estimated 3.3% in CY 2024. While short-term prospects have improved since early 2024 due to easing inflation and gradual loosening of monetary policy in several regions, the broader environment remains challenging. Structural headwinds, such as tighter credit conditions, supply-side bottlenecks, and lingering geopolitical risks, are keeping global growth below historical averages.

The United States has continued to outperform other advanced economies, with growth projected at 1.8% in 2025, though slightly down from 2.8% in 2024, as the economy absorbs the lagged effects of previous monetary tightening and persistent inflation. In contrast, the Euro Area remains subdued, with GDP growth expected to 0.8% in 2025, supported by the European Central Bank's first-interest rate cuts since 2019 (implemented in June 2024) and stronger domestic demand. However, countries like Germany, France, and Italy continue to struggle due to weak manufacturing performance, whereas Greece and Spain have benefited from robust tourism activity.

In China, growth has held up at a projected 4.0% for CY 2025, supported by targeted stimulus and a gradual recovery in the real estate sector. Growth in the rest of Asia is also benefiting from a revival in global trade and domestic demand. India remains one of the strongest performers globally, with GDP growth forecasted at 6.2% in 2025, supported by robust consumption, capital investment, and favourable demographics.

In Latin America and the Caribbean, growth is more uneven. Larger economies like Brazil and Mexico are seeing moderate expansions, but the overall regional outlook is weaker, with GDP growth forecast at 2.0% in 2025, due to external headwinds, commodity price volatility, and political uncertainty. Meanwhile, Sub-Saharan Africa's growth is expected to slow slightly to 3.8%, as global financial conditions tighten, and oil-exporting nations face declining revenues. The Middle East and North Africa (MENA) region is also seeing tempered prospects, with growth revised down to 2.6%, influenced by lower oil prices and ongoing geopolitical pressures.

Globally, industrial production has remained sluggish through the first half of 2025, constrained by high interest rates, trade fragmentation, and lingering supply chain disruptions. However, a mild recovery is anticipated in the second half of the year as global trade stabilizes and domestic demand for goods strengthens. Central banks in several advanced economies—including the Eurozone, Switzerland, Sweden, and Canada—have begun cutting rates to support demand, though inflation trends remain uneven. Disinflation

has progressed slower than expected, particularly in services and wage-heavy sectors, making monetary easing cautious and data-dependent.

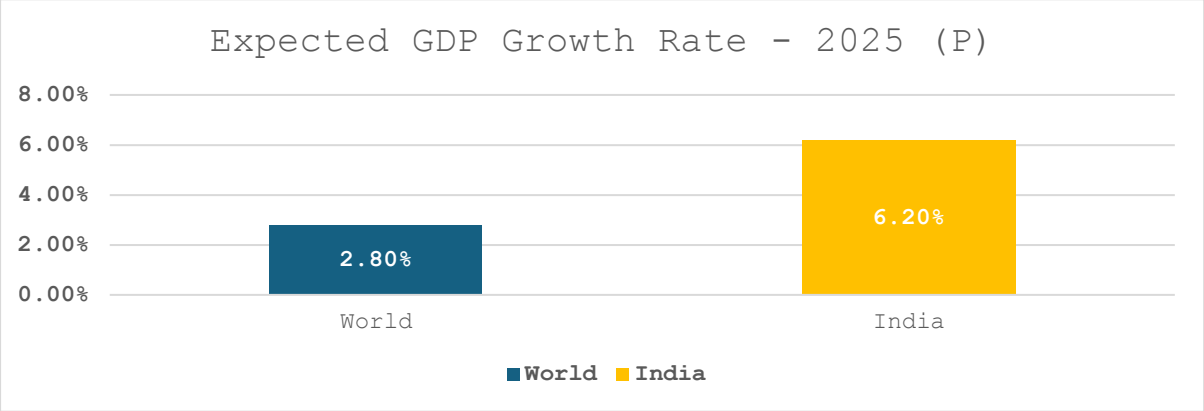
Overall, the global economy appears to be stabilizing, but growth in CY 2025 remains below historical averages. Advanced economies continue to grow modestly under the weight of tight policies and weak external demand, while emerging markets, particularly in Asia, show stronger but slowing momentum. The outlook for the remainder of 2025 depends significantly on geopolitical developments, the trajectory of inflation, and the pace of monetary easing.

2.Indian Macro-Economic Scenario

2.1 Gross Domestic Product (GDP)

India Expected to Grow at Twice the Pace of Global Economic Growth

The global economy continues to face persistent challenges, including the lingering effects of the COVID-19 pandemic, heightened geopolitical tensions, and climate-related disruptions that have affected energy and food supply chains. Global real GDP growth is projected at 2.8% in 2025, indicating a moderation in global momentum. In contrast, India's real GDP is projected to grow at 6.2% in 2025, continuing its trend of significantly outpacing global averages and reaffirming its position as the fastest-growing major economy. This implies that India is expected to grow at more than twice the pace of global GDP, supported by strong domestic demand, structural reforms, and increased infrastructure investment. India's resilience among the G20 economies further strengthens its role as a key driver of global economic growth in the coming years.



Global and India Growth Outlook Projections (Real GDP growth)

Notes: P-Projection; Source: IMF – World Economic Outlook, April 2025

India's Economic Growth Momentum Remains Strong - Surpassed USD 4 Trillion.

In FY 2024-25, India was the fifth-largest economy globally, with an estimated real Gross Domestic Product (GDP) at constant prices of INR 184.88 lakh crore, against the Provisional Estimate of GDP for the year 2023-24 of INR 173.82 lakh crore registering a GDP growth rate of 6.4% as compared to 8.2% in FY 2023-24. Since FY 2005, India's GDP growth has consistently outpaced global economic growth, often growing at nearly twice the global average, and this trend is expected to continue over the medium term.

Source: MOSPI, first advance estimates of GDP 2024-25 released on January 7th, 2025

In June 2025, India became the fourth-largest economy in the world and retained its position as the fastest-growing major economy. The country is projected to become the world's third largest economy by 2030, with an estimated GDP of USD 7.3 trillion.

Source: PIB, Press Release - India Becoming an Economic Powerhouse posted on June 16, 2025

GDP Growth Rate Projections for India

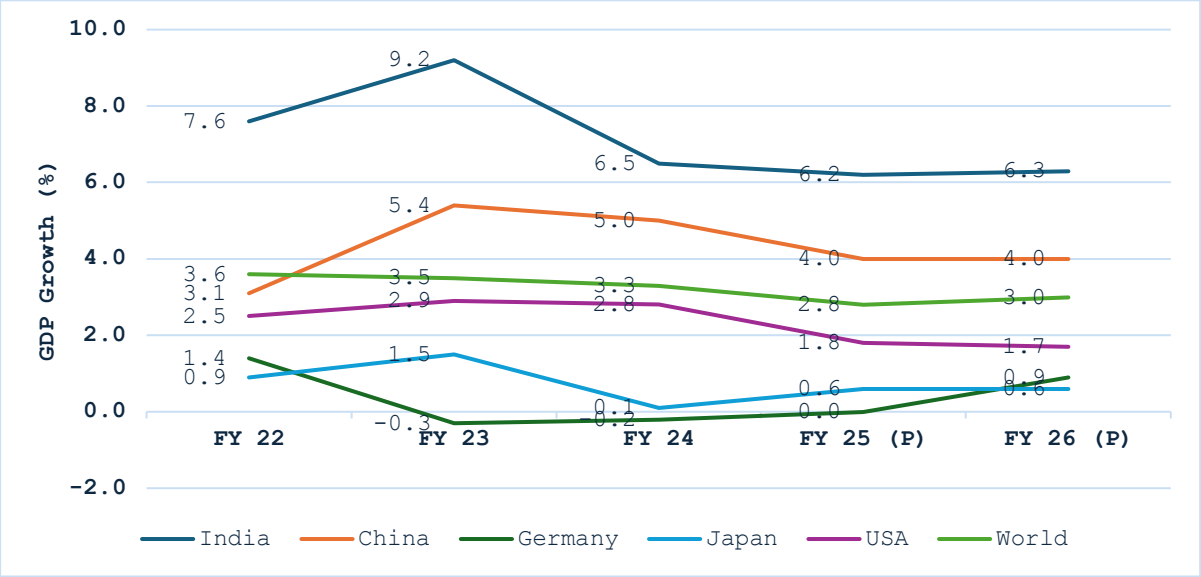
GDP growth projections by Government of India and other agencies are summarised below:

	Estimated GDP Growth Rate		
	FY 25E	FY 26E	FY 27E
Ministry of Finance, GOI	6.4%	6.3%-6.8%	N.A.
IMF*	6.2%	6.3%	N.A.
RBI#	6.6%	6.5%	N.A.
National Statistical Office (NSO)@	6.4%	N.A.	N.A.
PHDCCI@	6.5%	6.7%	6.7%
S&P Global@	6.8%	6.5%	6.8%
Morgan Stanley@	6.3%	6.5%	6.5%
Asian Development Bank#	6.5%	6.7%	N.A.
Moody's Agency	6.1%	N.A.	N.A.
Fitch Ratings@	6.3%	6.5%	6.3%

** Source: World Economic Outlook Update April 2025*

@ Data is updated as of 28th March 2025, #updated as of 10th April 2025

India and Top 5 Global Economies GDP Growth Forecast



Note: P = Projections, Source: IMF World Economic Outlook April 2025 update.

In September 2024, India achieved a significant milestone by overtaking Japan to become the third most powerful nation in the Asia-Pacific region, as per the Asia Power Index 2024. India's overall score rose to 39.1, reflecting a 2.8-point increase from the previous year, driven by growing influence across economic, military, and diplomatic dimensions.

Key factors behind India's rise include its strong economic performance, expanding and youthful workforce, and increasing strategic engagement across the region. India's Economic Capability improved significantly, supported by its position as the world's third-largest economy in terms of purchasing power parity (PPP). Additionally, a notable increase in its Future Resources score highlights the demographic advantage that is expected to sustain its growth trajectory in the coming years.

2.2 Gross Value Added (GVA)

Gross Value Added (GVA) is the measure of the value of goods and services produced in an economy. GVA gives a picture of the supply side whereas GDP represents consumption.

Industry and Services sector leading the recovery charge

- India's economy demonstrated robust growth across various sectors. The gap between GDP and GVA growth turned positive. The positive gap between GDP and GVA growth indicates robust tax collections contributing to GDP growth.
- India's sector-wise economic performance in FY 2024–25 reveals a shift in momentum across its primary, secondary, and tertiary sectors, with notable differences compared to the previous fiscal year.
- The Primary Sector—comprising agriculture, livestock, forestry, fishing, and mining & quarrying—registered a growth of 3.6% in FY25, showing a notable improvement from the 2.1% growth in FY24. This uptick can be attributed to stronger performance in agriculture and allied activities, along with moderate gains in mining and quarrying. However, erratic monsoon patterns and rising input costs may have constrained agricultural output during the year.
- In contrast, the Secondary Sector—which includes manufacturing, electricity, gas, water supply & other utilities, and construction—recorded a solid growth of 6.5% in FY25, though lower than the impressive 9.7% growth seen in the previous year. This resilient performance was primarily driven by a notable recovery in manufacturing and robust momentum in infrastructure-related segments like construction and utilities.
- The Tertiary Sector or services sector posted 7.2% growth in FY25, slightly lower than the 7.6% achieved in FY24, yet it remained a major pillar of overall economic growth. Strong performances were observed in trade, hotels, transport, financial services, real estate, and professional services. However, public administration and defence services saw more modest growth, slightly dampening the overall momentum in this segment.
- Overall, growth in India's real Gross Value Added (GVA) in FY25 was primarily driven by the resurgence of the secondary sector and sustained strength in key segments of the services sector, even as the primary sector showed signs of moderation.

Sectoral Growth (Y-o-Y % Growth) - at Constant Prices

Sector-wise growth in GVA at constant (2011-12) prices (in %)	FY 2024	FY 2025
Primary	2.1	3.6
Secondary	9.7	6.5
Tertiary	7.6	7.2

Source: MOSPI, First advance estimates of GDP 2024-25, released on January 7th , 2025

2.3 Consumer Price Index (CPI)

Inflation Stable Inflationary Environment

In fiscal year 2025 (FY25), India's General Index inflation, as measured by the Consumer Price Index (CPI), averaged 4.6%, marking the lowest annual inflation rate since 2018–19. This moderation in inflation reflects a significant improvement in the country's price stability post-COVID. In March 2025, CPI Inflation stood at 3.34%, the lowest monthly rate since August 2019, indicating sustained disinflationary momentum in recent months.

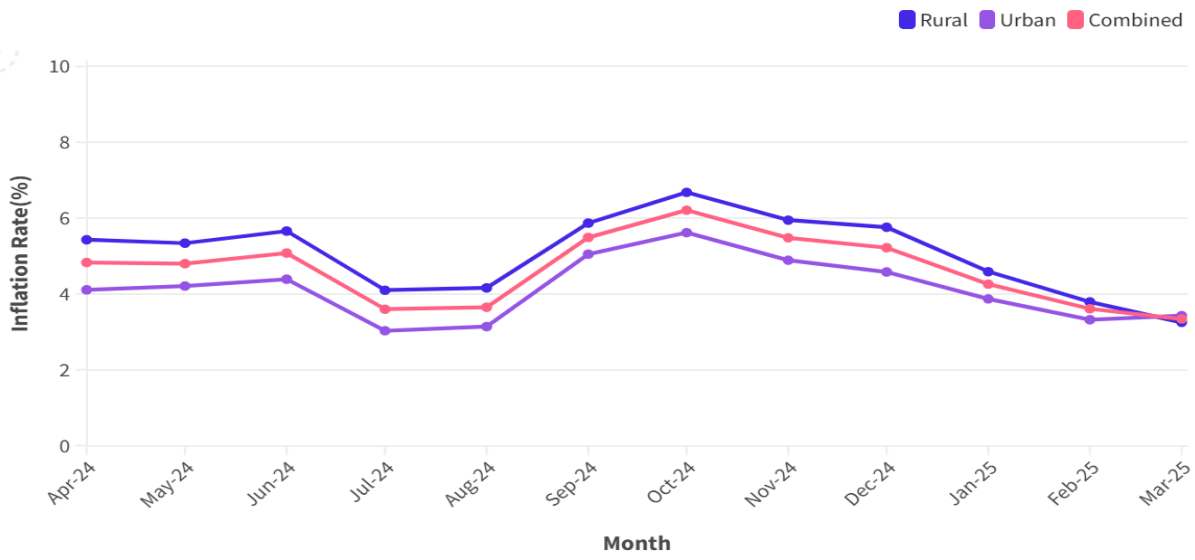
Source: - RBI, Annual Report-Inflation, Money and Credit Dated May 29th, 2025

Several key factors contributed to this decline in inflation:

The Reserve Bank of India (RBI) pursued a pro-growth monetary policy, aiming to strike a balance between supporting economic recovery and containing inflation. In parallel, the government actively intervened in food markets, particularly by augmenting buffer stocks of essential commodities and releasing them strategically to stabilize prices. These coordinated efforts helped ease supply-side pressures, especially on food inflation.

Looking ahead, projected CPI inflation for FY26 to average around 4%, signalling continued focus on maintaining price stability. In support of this trajectory, the RBI recently announced a cut in the repo rate, which is expected to result in a more accommodative monetary policy stance in the coming months. This environment of low inflation and easing interest rates may provide a favourable backdrop for economic expansion in the near term.

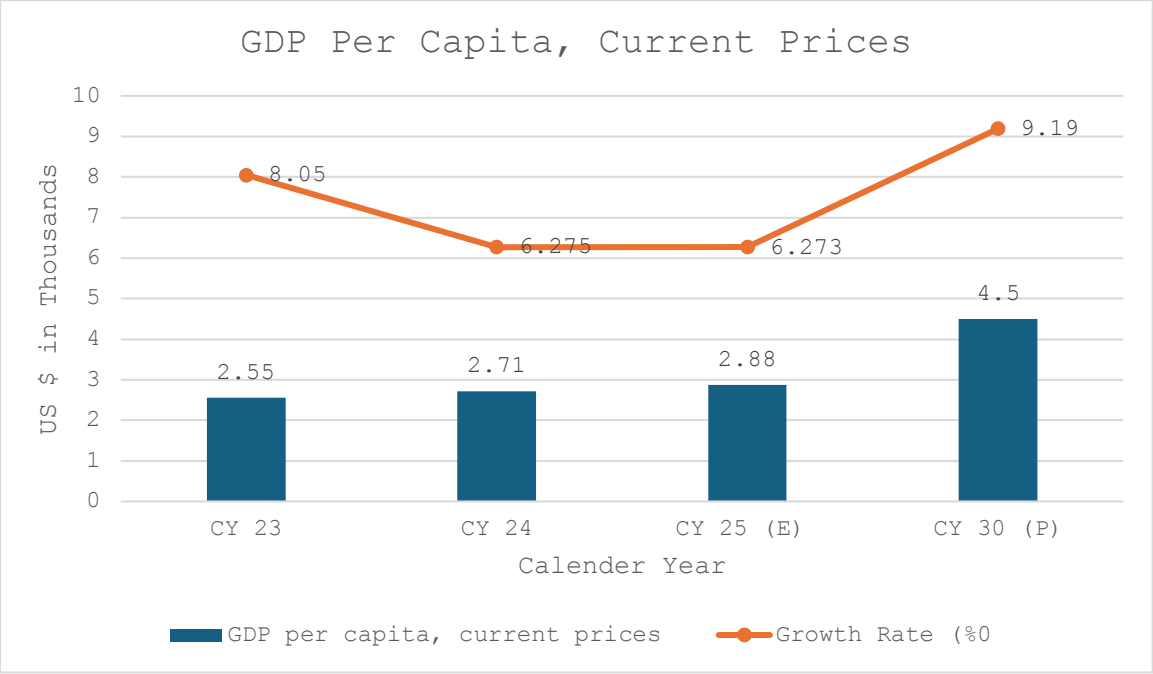
India's CPI Inflation Monthly



Source: MOSPI

2.4 India Per Capita GDP Forecast

Per capita GDP growth for India is estimated at 9.19 % CAGR between FY 2025-FY 2030. Increased individual incomes are expected to create additional discretionary spending, which may be beneficial for the sector.



Note: E = Estimated, P = Projected

Source: IMF Data Mapper, World Economic Outlook April 2025, India, GDP Per Capita

2.5 Private Final Consumption Expenditure (PFCE)

Private Final Consumption Expenditure (PFCE) represents the total spending by resident households on final consumption of goods and services, serving as a key indicator of consumer demand and overall economic well-being. It reflects the extent of household consumption and plays a crucial role in driving GDP growth. In FY2025, PFCE at constant prices rose to 56.7% of GDP, up from 56.1% in FY2024, indicating a gradual improvement in household spending patterns. This increase suggests stronger consumer confidence, supported by factors such as easing inflation, improving income levels, and a favourable consumption environment.

Source: - MOSPI, Second Advance Estimates of GDP 2024-25 dated February 28,2025

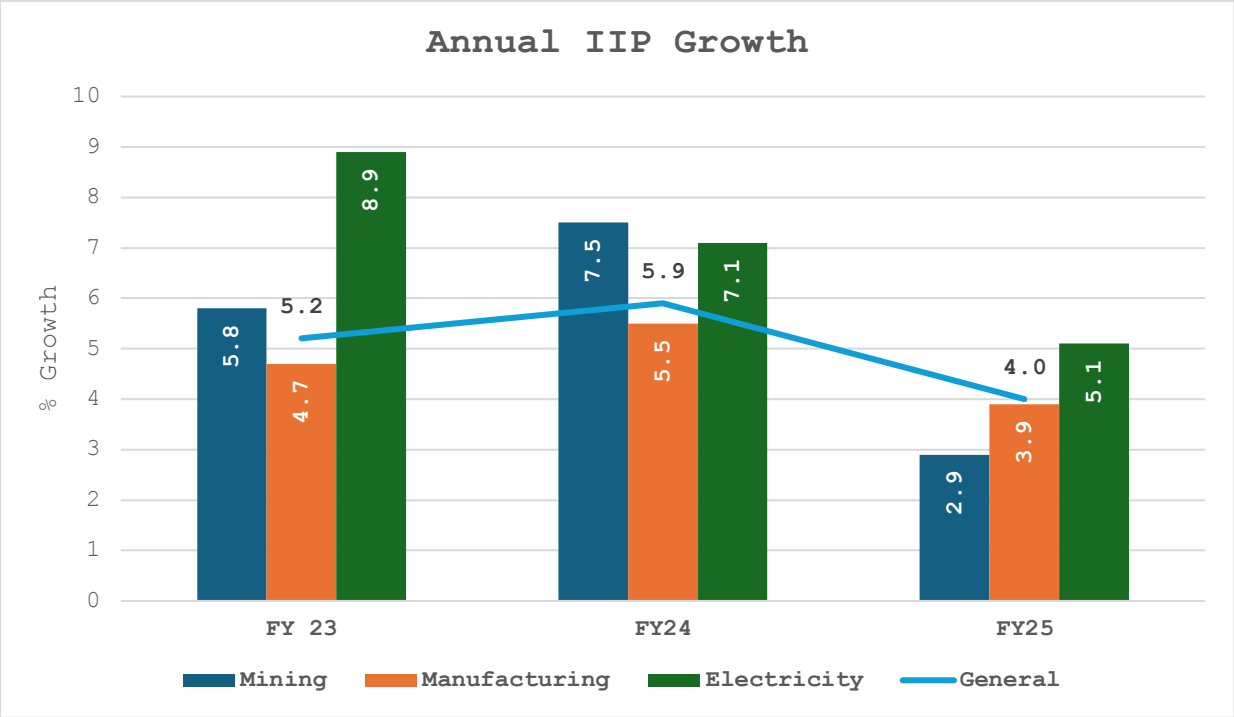
2.6 IIP Growth – Index of Industrial Production

As per the Index of Industrial Production (IIP), the industrial sector grew by 4.0% in FY 2025, moderating from 5.9% in FY 2024 and 5.2% in FY 2023. This deceleration in overall IIP growth in FY 2025 reflects a softening of industrial momentum amidst global headwinds and tighter financial conditions.

Among key components:

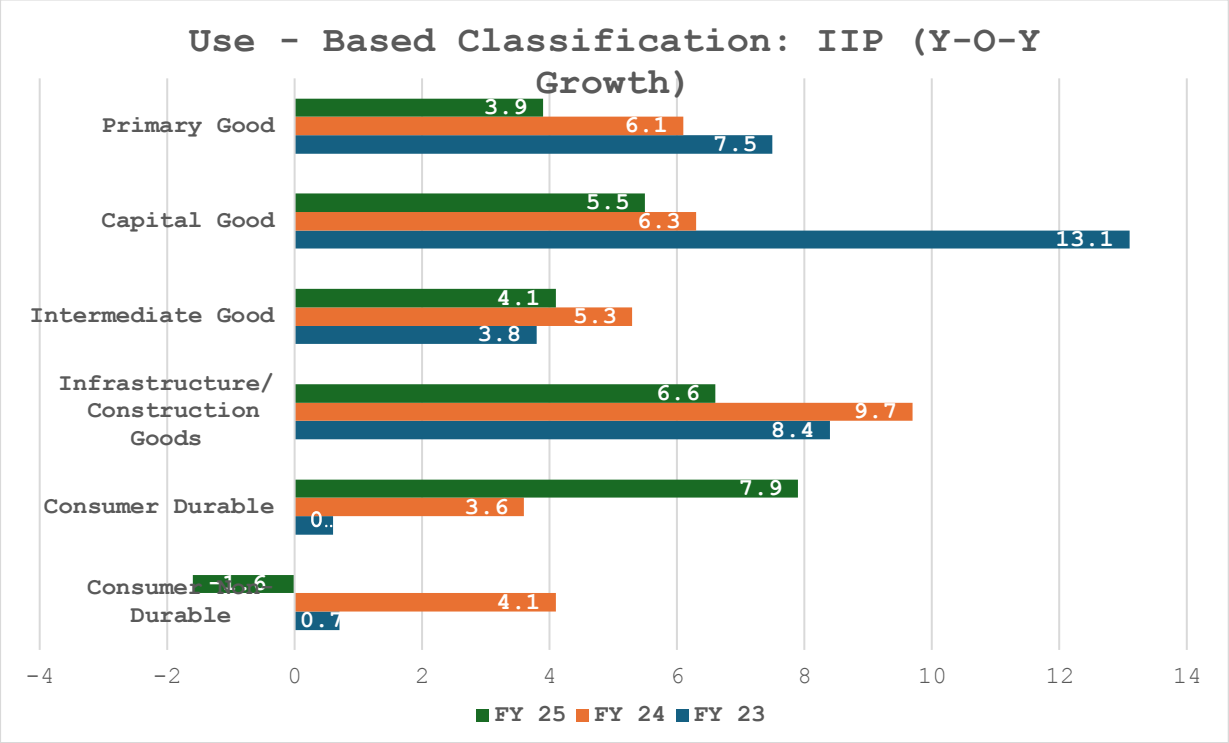
- **Manufacturing** (which holds a 77.6% weight in IIP) registered a slower growth of 3.9% in FY 2025, compared to 5.5% in FY 2024 and 4.7% in FY 2023.
- **Mining** growth also moderated sharply to 2.9% in FY 2025 from 7.5% in FY 2024 and 5.8% in FY 2023.
- **Electricity** growth remained relatively stable at 5.1% in FY 2025, slightly down from 7.1% in FY 2024 and significantly lower than 8.9% in FY 2023.

This slowdown indicates tightening domestic demand and spillover effects from a weaker global industrial cycle.



Source: Ministry of Statistics & Programme Implementation (MOSPI)

Use-Based Classification Trends:



Source: Ministry of Statistics & Programme Implementation (MOSPI)

According to the use-based classification:

- Capital Goods segment growth slowed to 5.5% in FY 2025, down from a high of 13.1% in FY 2023 and 6.3% in FY 2024, indicating a reduction in investment momentum.
- Primary Goods also witnessed slower growth at 3.9%, compared to 6.1% in FY 2024 and 7.5% in FY 2023.
- Intermediate Goods rebounded modestly to 4.1% in FY 2025, up from 3.8% in FY 2023, although still lower than 5.3% in FY 2024.
- Infrastructure/Construction Goods slowed to 6.6% in FY 2025 from 9.7% in FY 2024 and 8.4% in FY 2023, pointing to softening construction and infrastructure activity.
- Consumer Durables grew significantly by 7.9%, rebounding from 3.6% in FY 2024 and 0.6% in FY 2023, indicating improved demand in consumer electronics and appliances.
- In contrast, Consumer Non-Durables contracted by 1.6% in FY 2025, reversing the 4.1% growth in FY 2024, likely reflecting subdued rural and essential goods demand.

The divergence in growth across segments suggests an uneven industrial recovery in FY 2025. While certain consumer categories have rebounded, investment-related and primary sectors remain under pressure.

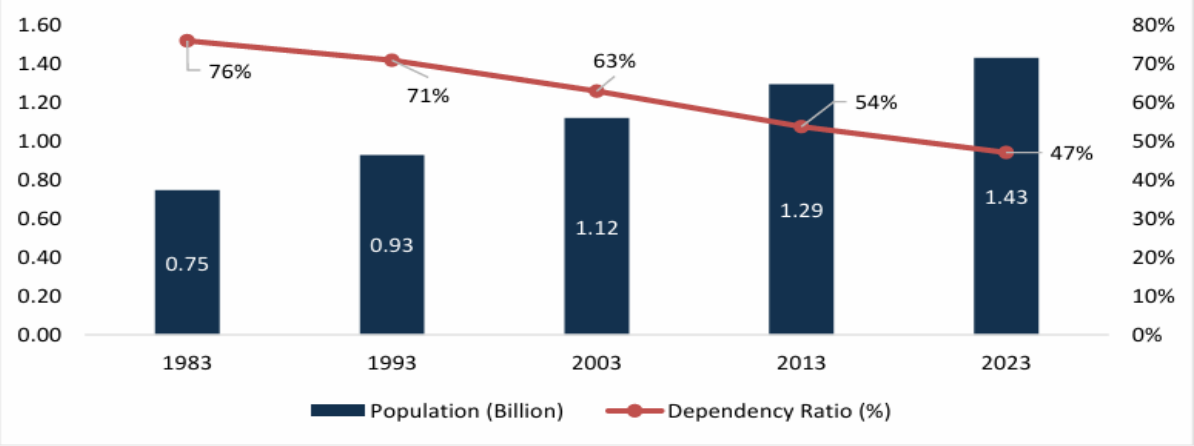
2.7 Overview on Key Demographic Parameters

2.7.1 Population growth and Urbanization

India's economic growth and expanding private consumption are intrinsically linked to its demographic and urbanization trends. According to the World Bank, India's population is estimated to have reached approximately 1.44 billion in 2024, reaffirming its position as the world's most populous country, ahead of China. This continued growth reflects an expanding labour force and consumer base, both of which are critical to sustaining long-term economic development.

A key metric in demographic analysis—the age dependency ratio, defined as the ratio of dependents (individuals aged below 15 or above 64) to the working-age population (15–64 years)—has been on a downward trajectory for several decades. From a high of 76% in 1983, the dependency ratio declined to 47% in 2023 and is estimated at 50.2% in 2024. This decline signifies that for every 100 working-age individuals, there are only about 50 dependents, indicating a favourable demographic dividend. A greater share of the population is now within the working-age group, potentially contributing to enhanced economic productivity and income generation.

Trend of India Population vis-à-vis dependency ratio



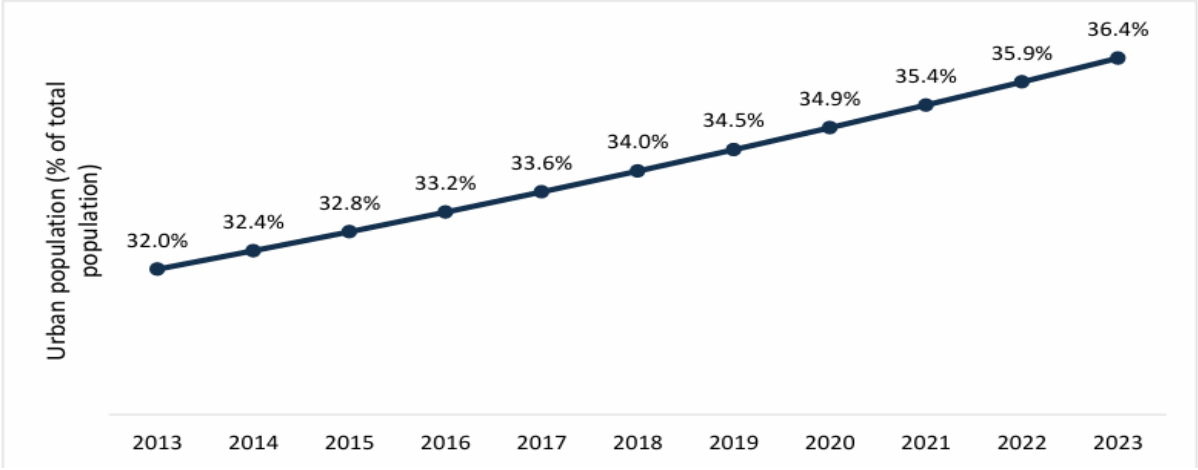
Source: World Bank Database

However, a parallel trend is emerging in the form of a rising old-age dependency ratio—the proportion of individuals aged 65 and above relative to the working-age population. This figure has gradually increased, reaching 10.4% in 2024, suggesting the onset of an aging demographic shift. This highlights the growing need for robust healthcare systems, pension reforms, and social security mechanisms to address future challenges associated with an aging population.

India's youthful demographic remains one of its most significant advantages. With a median age of around 29 years, India has one of the youngest populations globally. Nearly one-fifth of the world's youth resides in India, and as millions enter the workforce each year, this demographic bulge offers enormous potential—provided it is met with adequate job creation, education, and skills training.

Urbanization, too, is transforming India's socio-economic fabric. The urban population rose from 413 million in 2013 (32% of total population) to 519.5 million in 2023 (36.4%), and further to approximately 535 million in 2024 (36.9%), according to World Bank estimates. This rapid growth in urban areas underscores the need for sustainable urban planning, investment in infrastructure, and development of smart cities to accommodate and benefit from the shifting population dynamics.

Urbanization Trend in India



Source: World Bank Database

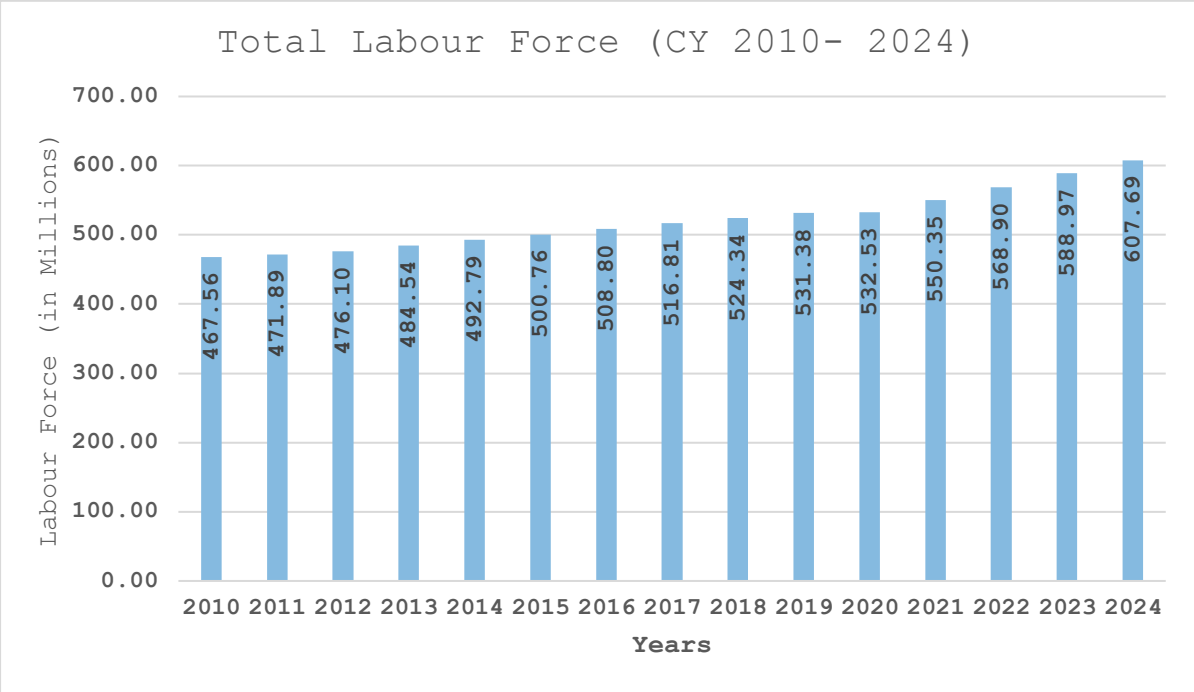
2.7.2 Labour Force in India

India's labour force has experienced significant growth over the past decade. In 2010, the total labour force was approximately 467.56 million. By 2024, this number had increased to 607.69 million, reflecting a Compound Annual Growth Rate (CAGR) of 1.89% over the 14-year period.

This upward trend underscores the expanding working-age population and the country's ongoing economic development. However, it also highlights the need for effective employment policies to ensure that the growing labour force is adequately absorbed into productive sectors.

The labour force participation rate (LFPR) has also seen fluctuations, influenced by various socio-economic factors. As of 2024, the LFPR stood at 45.1%, indicating the percentage of the working-age population that is either employed or actively seeking employment.

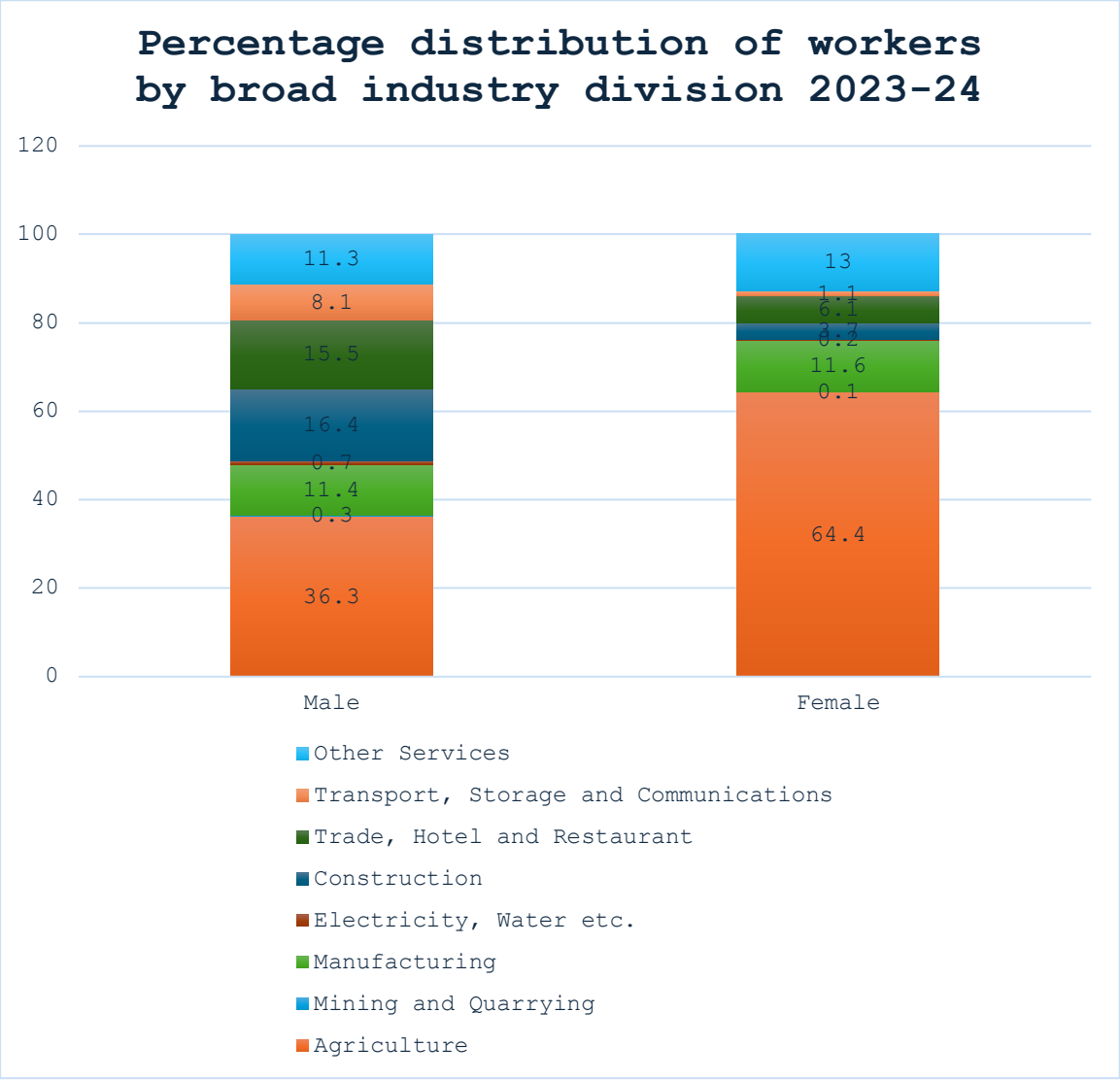
These statistics emphasize the importance of implementing strategies that not only create employment opportunities but also enhance the quality and inclusivity of jobs across different sectors of the economy.



Source: World Bank Database

2.7.3 Breakdown of Employment by Sector

According to the Periodic Labour Force Survey (PLFS) 2023–24, the employment distribution across various sectors exhibits distinct gender-based patterns. A significant portion of male workers are engaged in agriculture, followed by notable participation in construction, manufacturing, and trade-related activities. In contrast, female workers are predominantly employed in agriculture, with considerable involvement in manufacturing and other services sectors. While female representation in trade and construction is lower compared to males, Additionally, a substantial proportion of employed women are self-employed, often contributing as unpaid helpers in household enterprises or operating small businesses, indicating a reliance on informal employment avenues.



Source: Annual Report 2023-24, Periodic Labour Force Survey

2.7.4 Labour Laws in India

Labour is a subject under the Concurrent List of the Indian Constitution, enabling both the Central and State Governments to frame relevant legislation. In a major reform initiative, the Government of India has consolidated 29 existing central labour laws into four comprehensive Labour Codes to simplify compliance, reduce multiplicity of definitions, and promote transparency. These include:

- The Code on Wages, 2019
- The Industrial Relations Code, 2020
- The Code on Social Security, 2020
- The Occupational Safety, Health and Working Conditions Code, 2020

As of 31st December 2024, the Central Government and a majority of States/Union Territories had pre-published draft rules under all four Labour Codes. Regional consultations were held to align state-level rules with the central framework. Once fully implemented, these Codes are expected to harmonize the needs of workers and industry, facilitate ease of doing business, and support employment generation.

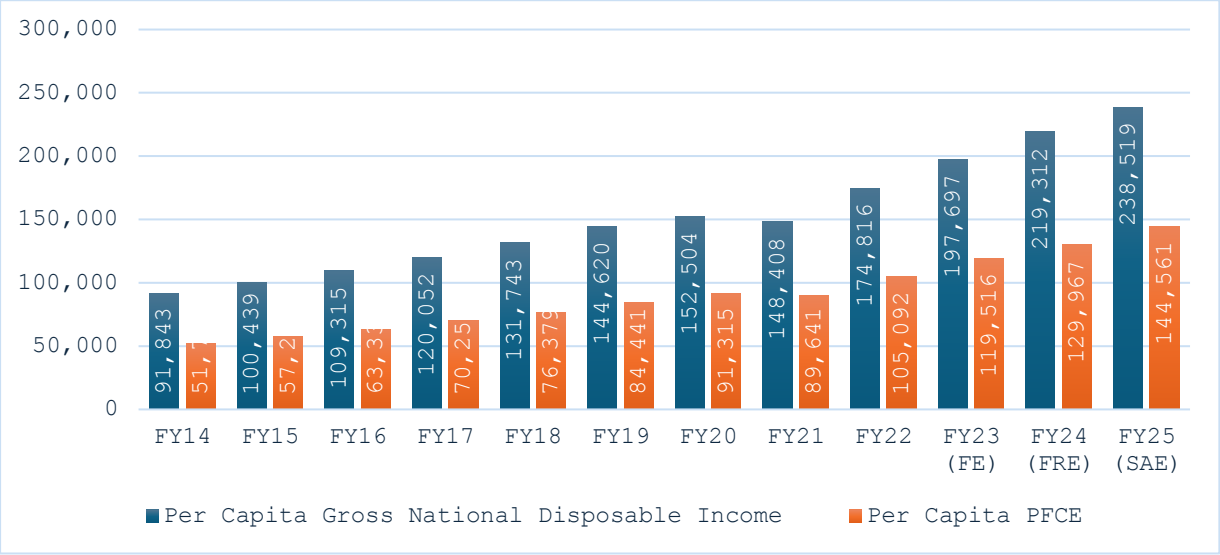
Additionally, the Ministry of Labour & Employment is revamping the Shram Suvidha Portal to improve regulatory compliance and has launched the e-Shram Portal to register workers from the unorganised sector. Over 30 crore registrations have been completed, and the portal has been integrated with 12 key social welfare schemes, enabling targeted delivery of benefits.

2.7.5 Disposable Income and Consumer Spending

Gross National Disposable Income (GNDI) represents the total income available to a nation's residents for consumption and saving after accounting for income transfers with the rest of the world. In FY24, Per capita GNDI grew by 9.85%, followed by a moderate growth of 8.05% in FY25. This steady increase indicates that households and businesses had more income at their disposal, which is critical for supporting both consumption and savings—key components of economic resilience and expansion.

The rise in GNDI has translated into higher consumer spending, as reflected in the growth of Private Final Consumption Expenditure (PFCE), which measures the total value of goods and services consumed by households. Per Capita PFCE grew by 8.04% in FY24 and further accelerated to 10.09% in FY25, highlighting strong consumer confidence and robust domestic demand.

Trend of Per Capita GNDI and Per Capita PFCE (Current Price)



Note: Data mentioned is in Rs. Crore, FE – Final Estimates, FRE – First Revised Estimates, SAE – Second Advanced Estimate; Source: MOSPI

2.8 Union Budget FY25-26 Highlights

The **Union Budget FY 2025–26**, presented by Finance Minister Nirmala Sitharaman, introduces a comprehensive set of measures aimed at stimulating economic growth, enhancing infrastructure, and fostering inclusive development. With a focus on sectors such as agriculture, MSMEs, infrastructure, innovation, and exports, the budget seeks to create a conducive environment for sustained economic expansion.

- **Capital Expenditure and Infrastructure Development**
  The government has earmarked a substantial ₹11.21 lakh crore (3.1% of GDP) for capital expenditure in FY 2025–26. This allocation is directed towards infrastructure projects, including rural development, manufacturing, and skill-building initiatives. Notably, the Urban Challenge Fund has been established with a corpus of ₹1 lakh crore, aimed at financing 25% of the cost of bankable urban infrastructure projects, thereby promoting sustainable urban development.
- **Support for MSMEs**
  Recognizing the pivotal role of Micro, Small, and Medium Enterprises (MSMEs) in India's economic landscape, the budget introduces several measures to bolster this sector. The Credit Guarantee cover has been enhanced to ₹10 crore, unlocking ₹1.5 lakh crore in additional funding for MSMEs over the next five years. Additionally, the establishment of a Fund of Funds with a ₹10,000 crore corpus aims to provide equity support to startups and potential MSMEs, focusing on high-growth sectors such as electronics and renewable energy.
- **Tax Reforms and Disposable Income**
  To stimulate consumption and investment, the budget introduces significant tax reforms. The tax-free income threshold has been raised to ₹12 lakh, and the new tax regime offers reduced rates for higher income brackets. These changes are expected to increase disposable income, thereby encouraging higher savings and investment among the middle class.
- **Focus on Agriculture and Exports**
  The budget prioritizes agriculture as a key engine of development, with increased allocations for agricultural credit and initiatives aimed at enhancing productivity. Furthermore, measures to promote exports include the reduction of customs duties on select goods and the introduction of policies to facilitate easier market access for Indian products.
- **Urban Development Initiatives**
  A significant increase in the budget allocation for the Ministry of Housing and Urban Affairs to ₹96,777 crore reflects the government's commitment to urban development. Key initiatives include the establishment of the Urban Challenge Fund, enhanced loans under the PM SVANidhi scheme, and substantial provisions for the Pradhan Mantri

Awas Yojana and Urban Rejuvenation Mission, all aimed at improving urban infrastructure and living standards.

The Union Budget FY 2025–26 presents a balanced approach to economic growth by addressing immediate consumption needs and laying the foundation for long-term sustainability. Through targeted investments in infrastructure, support for MSMEs, tax reforms, and sector-specific initiatives, the budget aims to foster an inclusive and resilient economy. These measures are expected to create new opportunities for financial institutions, as the growing demand for investment products will provide avenues for expansion and innovation in the financial services sector.

2.9 Concluding Remarks about Macroeconomic Scenario

The major headwinds to global economic growth remain significant, with escalating geopolitical tensions, volatile global commodity prices, high interest rates, inflationary pressures, instability in international financial markets, climate change, rising public debt, and the rapid evolution of new technologies. Despite these challenges, India's economy is relatively well-positioned compared to other emerging markets. According to the latest IMF forecast, India's GDP growth is expected to be 6.2% in 2025, maintaining its position as the fastest-growing major economy globally, well above the global growth projection of 2.8%. Key positive factors for the Indian economy include continued strong domestic demand, robust government support for capital expenditure, moderating inflation, growing investments in technology, and improving business confidence.

India's strategic position as a manufacturing hub is further strengthened by government initiatives, a skilled labour force, and a dynamic startup ecosystem, all of which bolster the country's economic outlook. The ongoing reforms and focus on innovation are enabling India to seize emerging opportunities, making it a growing player in the global manufacturing landscape. In addition, several high-frequency growth indicators—such as the Purchasing Managers' Index (PMI), E-way bills, bank credit, toll collections, and GST collections—have shown a positive trajectory in FY25. The normalization of employment post-economic reopening is expected to provide further support to consumption expenditure.

Public investment is also poised to grow, with the government allocating a significant ₹11.21 lakh crore for capital expenditure in FY25. The private sector's investment intentions are showing positive signs, as evidenced by increased new project investments and a strong import of capital goods. Furthermore, rural demand is likely to improve, bolstered by healthy sowing, better reservoir levels, and the positive progress of the southwest monsoon, coupled with the government's push for infrastructure investment and other policy measures. These factors are expected to further support the investment cycle and strengthen India's economic resilience in the coming years.

3.Drone Eco System and its current market scenario

An unmanned aerial vehicle (UAV), commonly known as a drone, is an aircraft without any human pilot, crew or passengers on board. The flight of UAVs may operate under remote control by a human operator, as remotely-piloted aircraft (RPA), or with various degrees of autonomy, such as autopilot assistance, up to fully autonomous aircraft that have no provision for human intervention. Drones, offer tremendous benefits to almost all sectors, including agriculture, mining, infrastructure, surveillance, emergency response, transportation, geo-spatial mapping, defence, and law enforcements, of the economy.

According to the Civil Aviation Ministry, as the global drone industry grows, the Indian drone industry is expected to reach INR120- 150 billion (USD1.5-1.9 billion**) by 2026. Currently, the use of drones is limited to mostly the infrastructure and agriculture sectors. However, an increasing number of drone applications coupled with favourable government regulations; a growing number of startups who are engaged in identifying new applications for drones are among the primary reasons why the drone industry is expected to continue to grow. This has also spurred mergers and acquisitions in the sector, with around 49 deals recorded in the last four years with an average EV/total income greater than 10x2.

Drones were initially launched in India as defence equipment but use cases for drones have developed over time. It now carries anything and everything, including vaccinations and medical supplies, as well as gadgets, food and groceries. The growth within the drone industry is primarily due to:

Increasing push from Government:-

- The government of India (GOI) intends to make India a global drone hub by 20303 , for which understated initiatives have been established.
- Liberalised policies to help individuals and businesses leverage drone technology.
- The government of India plans to attract INR50 billion (USD6.7 billion*) investment in the next 3 years and create more than 10,000 jobs and encourage MSME investments by easing eligibility for the PLI scheme2.

Increasing interest from startups and large corporates:-

Drone startups in India are working to strengthen their technological abilities in order to compete with global competitors.

Corporates in India are also investing within the drone ecosystem.

Rising research and development effort:-

Since 2015, nearly 37 patents around technologies, such as for propeller safety in automated aerial vehicles and hybrid aerial vehicles4 , have been filed by leading drone companies.

Development of custom built and technologically advanced variants is expected to propel the adoption further.

Drone Service Area;-

Industrial sites:-
Drones are being employed by industries to simplify processes, increase efficiency and replace hazardous jobs. Also, using AI-enabled drones helps inspectors spot faults, allowing them to swiftly address the issue while ensuring road and bridge safety.

Infrastructure:-
As drones provide an aerial view, it is simpler to produce 3D models of the site, which aids in identifying areas that require attention. Drones also help in monitoring the construction work, planning surveys and mapping of properties.

Agriculture:-
Drones assist farmers in minimising time and increasing efficiency by monitoring crops and livestock, as well as spraying fertilisers and pesticides. The use of agriculture drones is on the rise and the government of India is engaged in promoting the same.

Healthcare:-
Time sensitivity is critical to healthcare industry. As a result, drones can be a viable option for providing faster, cheaper and more reliable delivery solutions for medicine and vaccines, as well as providing sanitisation services through spraying.

Energy and utilities:-
Drones equipped with a thermal scanner and RGB camera can collect data quickly and alert the user if an anomaly is detected. Further, the GOI has mandated the use of drones for mine inspections, which is expected to reduce thefts or audit mismatches by at least 20 per cent.

Cost analysis: traditional techniques versus Drones:-

Drones' potential to reduce costs while boosting the value of information acquired through these systems has been a key factor in encouraging drone use. Traditional working techniques that relied on occasionally faulty and time-consuming procedures can now be replaced with low-cost, information-rich drones. Drone usage can drive significant cost efficiencies, mainly within the agriculture and infrastructure sectors, enabling mass adoption. The following table touches upon a few of the application areas with the cost saving details.

Areas	Existing process	Potential drones service benefits
Planning surveys and mapping	Ground-based manual data collection Manual analysis and single-point decision-making.	Automated analysis and collaborative decision-making 10x faster and 10000x more data points on a digitised base for better plans.
Construction monitoring	Excel-based progress tracking without visual verification.	Automated object recognition, counting and progress tracking on drone maps. 80 per cent faster and improved transparency and on-site governance.
Earthworks management	Manual data collection and reporting. Paper-based volumetric tracking without visual verification.	30x faster data collection and 350x more data points than with traditional (Global navigation satellite system) GNSS survey. 4x faster turnaround and end to end tracking
Agriculture crop monitoring and spraying	Manual applications – unsafe, in-efficient and limited access to skilled labor Erroneous, single point-decision making.	10x faster turnaround, efficient and cost saving. Automated analysis and collaborative decision making
Industrial asset maintenance and sustainability	Erroneous, unsafe, and infrequent manual inspections. Ad-hoc manual patrolling with no visual evidence.	Automated diagnostics from safe and frequent aerial inspections. Real-time, centralised view of inaccessible and remote assets.

Government initiatives to enhance India's drone ecosystem:-

With the aim of making India a global drone hub by 2030, a total of 12 central ministries are involved in trying to boost the indigenous demand for drone services. This is likely to create demand for around 1 lakh drone pilots in the upcoming years18. The central government has implemented the following reform initiatives to promote India's emerging drone industry.

Drone airspace map:-
In September 2021, the Indian Government opened 90 per cent of Indian airspace as a green zone for drones flying up to 400 feet.

Drone import policy:-
The government announced in February 2022 that it had restricted the import of foreign drones while allowing the import of drone components.

Production-linked incentive scheme:-
Under this initiative, the government will provide a total incentive span over three fiscal years, of INR1.2 billion (USD162 million*) to drone manufactures/industry.

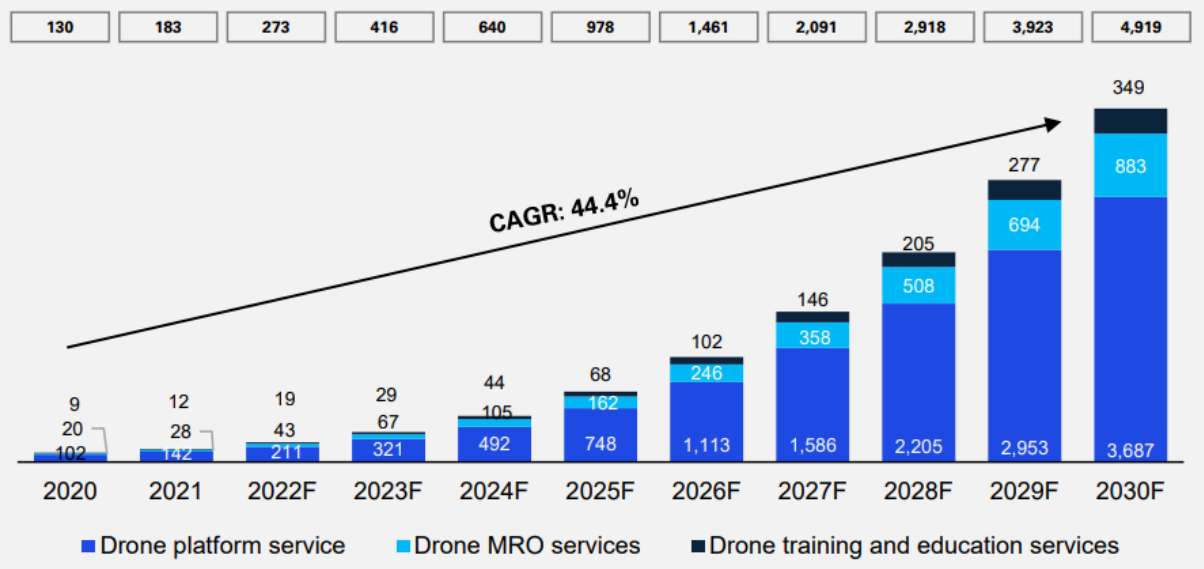
Agricultural drones monetary grant program:-
To promote the use of kisan drones, the GOI is providing financial incentives. For instance, Farmers Producers Organisations can receive a up to 75 per cent subsidy of the cost of an agricultural drone.

An evolving concept: Drones-as-a-Service (DaaS):-

The advent of drones-as-a-service is helping enterprises manage expenses. The price of an enterprise-level drone can be incredibly expensive, which is why most companies are opting for drones as a service.

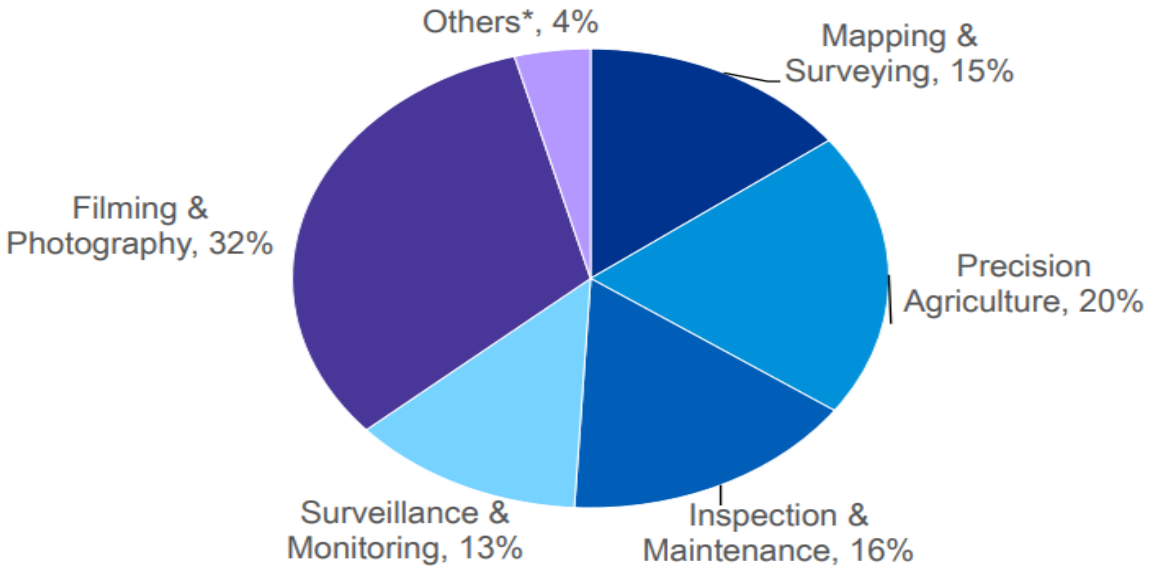
The drone services market is divided into three categories - drone maintenance, repair and overhaul (MRO), drone platform services and drone training and education services. The drone service market in India was valued at USD130.4 million in 2020 and is expected to reach USD4,918.9 million by 2030, at a CAGR of 44.4 per cent8 . Drone service market segment, drone MRO services and drone training and education services are predicted to grow at a CAGR of 46.8 per cent and 45.2 per cent, respectively, from 2020 to 2030. By 2030, the combined share of these two segments is expected to be 25 per cent

Indian drone service market (In USD million)

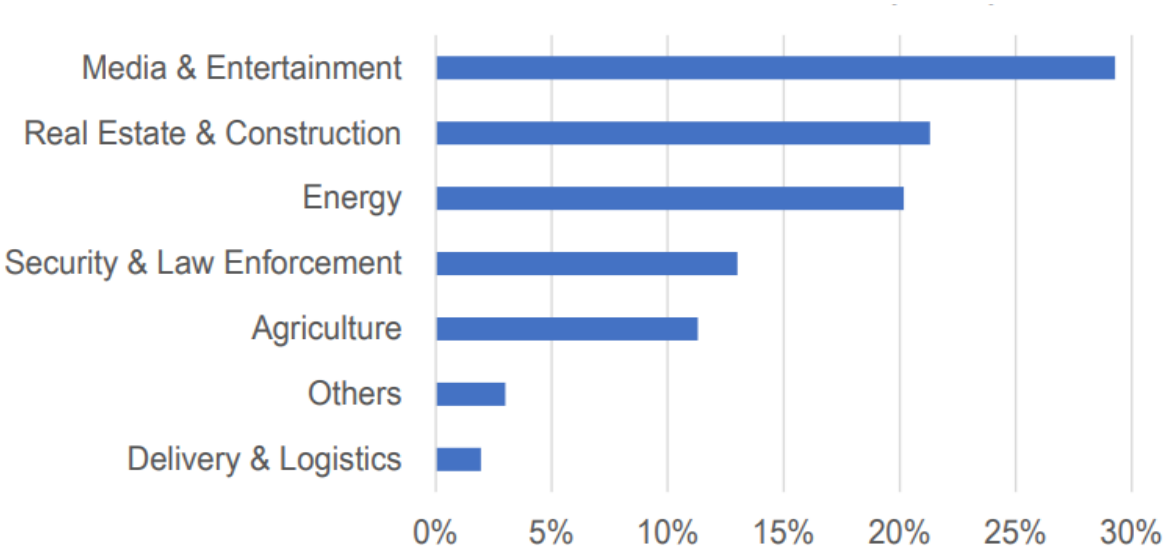


Drone Industry is expected to be the significant creator of employment and economic growth due to its reach, versatility, ease of use, especially in India's remote and inaccessible areas. Aerial cinematography, land surveys, monitoring agriculture & mining & construction activities, disaster management and mapping national highways and railway tracks are critical growing applications of drones in India.

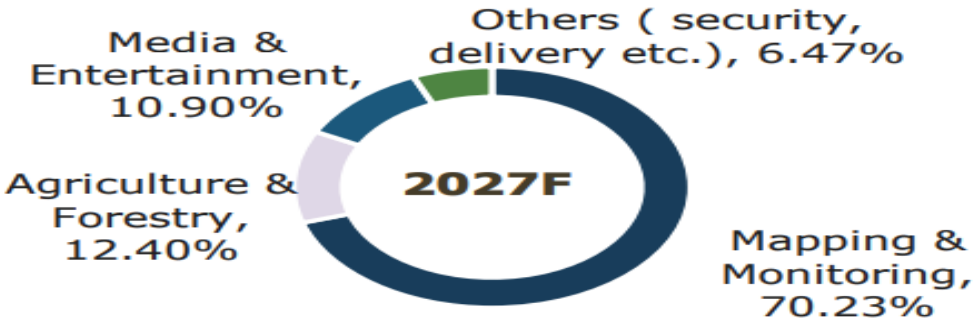
Global Drone Market Outlook based on Applications (2021):-



Market Outlook based on End Users:-

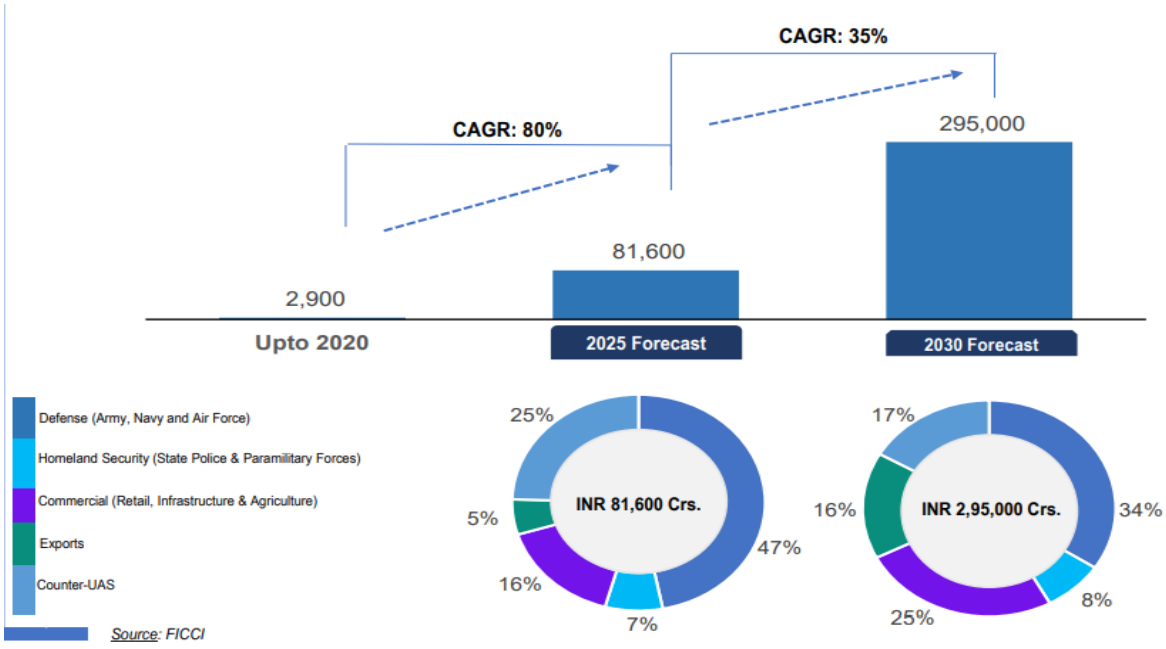


India Drones Market Share By Value, By Application, 2027F



Mapping & Monitoring comprises numerous use of drones that range from large-scale mapping, urban modelling, defence monitoring etc. and find usages across sectors

Drone Market Potential In India:-
Indian Drone Market Potential Forecast (in INR Crores) and Distribution across End-Use Applications:-



Sector wise use of Drone Service:-

Sector	Benefits	Cases
Défense	Border Security & Surveillance Strikes & Combats Threat Assessment Swarm attack Counter drone	The Indian start-up Sagar Defense Engineering has created "Varuna," India's first people-carrying platform, a VTOL UAV without a pilot. One person can fit inside the drone at a time. It has been specially made for the Indian Navy which will be initially used for transferring materials. The Archer-NG armed drone has a 300 kg armament capacity, including anti-tank guided missiles and smart anti-airfield weapons (SAAWs).
Energy & Utilities	• Monitoring & Maintenance. • Surveillance & Incidence Response. • Transmission power patrolling. • Powerplant & Transmission corridor mapping. • Pipeline and other asset monitoring. • Surveillance and incidence response. • Construction monitoring • Assist in predictive maintenance • Inspection of offshore platforms	Maharashtra State Electricity Transmission Company Limited has utilized drones for EHV Line Patrolling. These drones include high-resolution cameras with normal vision, thermos vision, and GPS capabilities. The drones, which are being used for a variety of duties including preventative maintenance, have been providing swift and precise surveys of lines and substations.
Mining	Monitoring and Inspection Stockpile and Quarry Management	MCL, a subsidiary of Coal India, has implemented drone technology in coal

	Hazard Identification Haulage road optimization	mines for volume measurement, environmental monitoring, and photogrammetric mapping of mines to digitalize the mining process. Through the VIHANGAM portal, the technology allows for the real-time transmission of aerial footage of mining operations from mines to an online platform.
Housing And Urban Affairs	Monitoring and Inspection Incident reporting Planning/ Digital Elevation Model Land Mapping Surveys	On September 30, 2022, the Supreme Court ordered the Central Government to employ drones to undertake geospatial mapping of the whole city and digitize land records to prevent encroachments and widespread residential property misuse.
Agriculture	Soil & Crop Health Scans Irrigation and Aerial Seeding Fertilizer & Pesticide Spraying Plant size, and crop health monitoring Farm output estimates Vegetation indices, plot statistics River erosion/restoration tracking Insurance claim surveys Agri data exchange for drones	The Anna University-supported drone manufacturing business has created an Agrigator drone, the only certified petrol engine-based hybrid drone that doesn't need its batteries changed frequently. The drone has been developed by Dhaksha Unmanned Systems Pvt Ltd.
Forest & Wildlife Conservation	Hazardous Activity Monitoring Pollution-level Assessment and Source Tracking Anti-poaching Monitoring	The government of Madhya Pradesh's Forest Department intends to employ drones to monitor the eight wild cheetahs it obtained from Namibia at Kuno National Park.

	Migratory behaviours of wildlife Tree health monitoring Forest Mapping	
Healthcare & Disaster Management	Essential & Healthcare Items Delivery Sample collection from remote or epidemic/ pandemic affected areas Impact assessment during disasters Transport medicines, food, and essentials in disaster-affected areas Search and Rescue Patrolling in remote areas	The Arunachal Pradesh government launched "Medicine from the Sky," a drone-based healthcare network, on August 15, 2022, from Seppa to Chayang Tajo in the East Kameng district. On the basis of the project's clear image of operational challenges, financial viability, and regulatory concerns, the government will develop a policy and act to gradually accept this developing technology.
Information And Broadcasting	Hazardous Activity Monitoring Pollution-level Assessment and Source Tracking Anti-poaching Monitoring Migratory behaviors of wildlife Tree health monitoring Forest Mapping	When the country has been blocked off to outsiders and is under lockdown, remote-controlled UAVs have permitted media organizations to film or take pictures of different parts of the lockdown and cover them.
Railways	Surveillance and Incidence Response Visual Inspections and Maintenance Construction Monitoring Equipment Monitoring	In order to monitor its assets and guarantee passenger safety, the Railways has purchased Ninja unmanned aerial drones with real-time tracking, video streaming, and automatic failsafe mode
Highways & waterways	Visual Inspections Incident Response Construction monitoring	NHAI has made the use of drones for monthly video recording of National Highway projects during all stages of development, construction, operation, and maintenance

	Dynamic monitoring utilizing sensors for water quality	mandatory in order to increase transparency and uniformity. 2. The Ministry of Road Transport and Highways unveiled Skye UTM, a cutting-edge drone air traffic management system, with a capacity of around 4,000 planes per hour and 96,000 flights per day. It combines human aviation space with an unmanned aerial traffic control system that operates in the cloud

Future outlook:-

In the recent years, the Indian government's Aatmanirbhar Bharat initiative has bolstered the domestic drone sector. Additionally, waivers for pilot permits, reduced and simplified procedures, the creation of new drone corridors, incentives for local manufacturers and partnerships with corporations are likely to allow drones to transform the scenario across numerous industries in the country. And this is in line with the government's intention to develop not just drone manufacturing, but also the booming drone services industry21 . In the long run, companies will need to build a strong working relationship with the government in order to be more compliant with tender eligibility criteria and increase their chances of winning the same. Access to a strong network of pilots across the country is expected to play a vital role in winning a tender or a service client. Also, a strategic technical or commercial tie-up for joint development of products is expected to provide a competitive edge.

India is a major importer of drones, accounting for 22.5 per cent of total global drone imports22. Though most drones are employed for military activities, commercial drones are growing increasingly popular. With a total value of over USD900 million22 , the commercial end-use drone sector is predicted to exceed the military industry. And by 2025, India is forecasted to be the world's third-largest drone market22. It is anticipated that in coming years, in addition to facilitating a thriving manufacturing industry, a surge in demand for drones across various sectors, such as agriculture, defence, retail and e-commerce India, will lead to a rise in investment by corporations and startups. This, collectively, will help India to be a one-stop destination for many international investors operating in the drone industry

Sources:-
www.nedonewdelhi.in/assest/pdf/NEDO_Drone_Study_Final_Report_10052023.pdf
https://dst.gov.in/sites/default/files/Draft%20NGP%2C%202021.pdf

Central Government Budget 2025 for Drone Industry:-

India's drone industry is poised for a significant leap forward, thanks to the recent Union Budget allocations for 2025-26. With increasing demand for drones across sectors such as agriculture, defence, and logistics, the government's strategic focus is propelling the industry toward global prominence.

The highlight of Budget 2025 for the drone sector is the ₹57 crore allocation to the Production-Linked Incentive (PLI) scheme. This 7.5% increase from the previous year's ₹33 crore demonstrates the government's commitment to boosting India's domestic drone manufacturing.

The PLI scheme incentivizes businesses to produce drones and components locally, thus reducing reliance on imports while encouraging innovation. This funding will pave the way for cheaper, more accessible drones across industries. With sectors like agriculture, surveillance, and logistics increasingly relying on drones, local manufacturing is essential to ensure cost-efficiency and quicker turnaround times.

The Case for Larger Allocations:-

While the increase in the PLI allocation is encouraging, industry stakeholders are calling for more substantial investments. Experts suggest that raising the PLI budget to ₹1,000 crore or even ₹2,000 crore could provide the necessary fuel to elevate India's global standing in the drone industry.

A larger allocation would not only help scale up domestic production but also provide room for more advanced innovations in drone technology. The growing global demand for drones makes it imperative for India to ramp up its production capabilities and remain competitive on the world stage.

Drones: A Key Player in Regional Connectivity

Budget 2025 also recognizes the importance of drones in enhancing regional connectivity. The ₹540 crore allocation for the UDAN (Ude Desh ka Aam Naagrik) scheme is a testament to the government's understanding of drones' potential in improving last-mile connectivity and air mobility.

Drones are expected to support cost-effective logistics, real-time monitoring, and seamless connectivity in remote regions, further contributing to India's goal of improving regional air travel. The integration of drones into the UDAN scheme opens up new possibilities for drone operators and manufacturers while also enhancing India's air mobility infrastructure.

1. An overview on Geospatial Industry

The geospatial industry is experiencing rapid growth and innovation, driven by advancements in technology and increasing adoption across various sectors. Originating from the ancient art of cartography, the field has evolved dramatically with the advent of modern technologies like Geographic Information Systems (GIS), Global Positioning Systems (GPS), remote sensing and 3D mapping. Today, the industry plays a crucial role in a wide range of applications, from urban planning and disaster management to agriculture and transportation. The global geospatial solutions market size was USD 555.31 billion in 2023, calculated at USD 626.13 billion in 2024 and is expected to be worth around USD 2,155.72 billion by 2034, as per Precedence research. This growth is driven by the increasing integration of spatial analysis into governance, enterprise and consumer applications. The proliferation of geospatial technology is a testament to its importance in today's data-driven world, where the ability to link data to specific locations is essential for informed decision-making. Technological advancements have played a pivotal role in the evolution of the industry. Innovations in satellite imagery, aerial imagery, GPS, GIS and 3D mapping have led to more sophisticated and accurate methods of geospatial data collection and analysis. These technologies have expanded the range of applications for geospatial data, enabling industries to gain deeper insights and make more precise decisions.

The growing adoption of geospatial solutions across various industries is another significant driver of market growth. Sectors such as urban planning, agriculture, land resources, transportation, telecommunications, energy and defence, are increasingly recognizing the value of geospatial data in enhancing efficiency and optimizing operations. In urban planning, it aids in designing smarter, more sustainable cities. There is a growing awareness and usage of 3D geospatial data for urban planning. In agriculture, geospatial technology is used to monitor crop health, optimize irrigation and manage resources more effectively. Government initiatives and investments are also crucial in propelling the geospatial industry forward. Governments around the world are investing in geospatial technologies and infrastructure to support national development, disaster management and public safety. These investments not only drive innovation within the industry but also create opportunities for collaboration between the public and private sectors, fostering the development of new solutions and services.

The integration of geospatial data with emerging technologies such as the Internet of Things (IoT) and Big Data analytics is opening new avenues for businesses and governments alike. This convergence allows for more comprehensive analysis and real-time insights, enabling organizations to optimize processes and improve decision-making. IoT devices can provide real-time geospatial data, which, when analyzed alongside other data sources, can lead to more accurate predictions and more efficient operations. The rising demand for location-based services (LBS) is another factor

contributing to the growth of the geospatial industry. The widespread use of smartphones and mobile devices has fuelled the popularity of LBS, such as navigation, local search and geo-targeted advertising. Climate change and environmental concerns are also driving the demand for geospatial solutions. As the impacts of climate change become more apparent, governments and organizations are seeking ways to monitor, analyse and mitigate these challenges. Geospatial technology plays a critical role in this effort, providing the tools needed to assess environmental changes, manage natural resources and plan for sustainable development. As the industry continues to evolve, it will play an even more vital role in addressing global challenges and supporting informed decision-making. The future of the geospatial industry is bright, with significant opportunities for growth and development in the years to come.

Global Geospatial Trends:-

The global geospatial industry is evolving rapidly, driven by technological innovation and the increasing demand for spatial data across various sectors. The integration of geospatial technologies with emerging technologies, the growth of location based services and the emphasis on sustainability and smart cities are among the key trends shaping the future of the industry. As these trends continue to unfold, the geospatial industry is poised to play an increasingly critical role in addressing global challenges, driving economic growth and improving the quality of life for people around the world.

The global push towards smart cities is driving the adoption of geospatial technologies in urban planning and management. As cities become more densely populated, the need for efficient infrastructure, resource management and service delivery become paramount. Geospatial data and tools are being used to design smart city solutions that optimize land use, improve traffic flow, monitor environmental conditions and enhance public safety. Governments and municipalities are increasingly investing in GIS, IoT and 3D mapping technologies to create smarter, more sustainable cities. The trend towards urbanization, particularly in emerging economies, is expected to further drive the demand for geospatial solutions in the coming years. 3D mapping and Digital Twin technologies are becoming increasingly important in the geospatial industry.

3D mapping involves creating three-dimensional geometric models of the physical environment, which can be used for applications such as urban planning, infrastructure management and real estate development. Digital Twin, which are virtual replicas of physical objects or environments, are being used to simulate and analyse real-world scenarios in various industries, including manufacturing, construction and city management. The ability to create detailed 3D models and Digital Twins is enhancing decision-making, improving operational efficiency and enabling predictive analysis.

The convergence of geospatial technologies with other emerging technologies such as artificial intelligence (AI), machine learning (ML), the Internet of Things (IoT) and blockchain is one of the most significant trends in the industry. AI and ML are being used to automate the analysis of large geospatial datasets, enabling faster and more accurate insights. AI-driven algorithms can detect patterns in aerial and satellite imagery to monitor land use changes. IoT devices, such as smart sensors, are providing real-time geospatial data that can be used for applications like smart city management and environmental monitoring. Blockchain technology is being explored for securing and validating geospatial data transactions, ensuring data integrity and trustworthiness.

The proliferation of smartphones and mobile applications has led to an exponential increase in the use of location-based services (LBS). LBS, which rely on geospatial data, are integral to navigation apps, ride-hailing services, local search and social media platforms. As consumers and businesses increasingly rely on real-time location information, the demand for LBS is expected to continue growing. Additionally, advancements in 5G technology are expected to enhance the accuracy and speed of LBS, enabling new applications such as augmented reality (AR) and real-time location tracking for logistics and supply chain management.

The field of Earth observation and remote sensing is experiencing significant advancements, driven by the increasing availability of high-resolution satellite and aerial imagery. The launch of new satellites with advanced sensors has improved the resolution, frequency and coverage of remote sensing data, enabling more detailed and timely observations of the Earth's surface. Manned aerial survey programs are increasingly becoming popular now wherein very high-resolution geospatial datasets from optical and LiDAR sensors are being acquired very fast. UAVs (unmanned aerial vehicles) are also being widely adopted for mapping, surveying and monitoring applications for smaller areas, offering flexible and cost-effective solutions for capturing geospatial data. These advancements are expanding the use of remote sensing in agriculture, disaster management, environmental monitoring and urban planning.

As the volume and diversity of geospatial data continue to grow, there is a growing emphasis on data interoperability and the adoption of standardized formats and protocols. Interoperability ensures that geospatial data from different sources can be seamlessly integrated and used across various platforms and applications. Organizations such as the Open Geospatial Consortium (OGC) and International Standards Organisation TC211 are working to develop and promote standards that enable the sharing and integration of geospatial data. The trend towards open data and the adoption of cloud-based geospatial platforms are also contributing to greater data accessibility and collaboration across the industry.

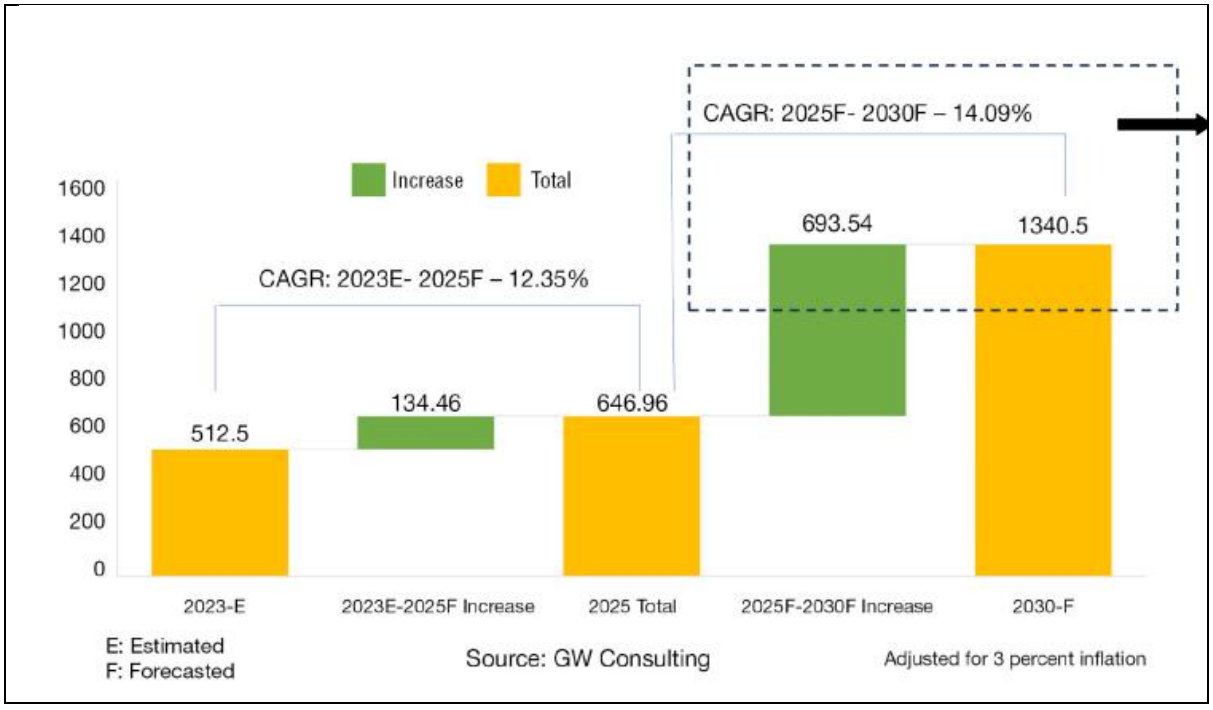
The increasing focus on sustainability and environmental protection is driving the use of geospatial technologies for monitoring and managing natural resources. Geospatial data is being used to track deforestation, monitor water quality, assess the impact of climate change and support conservation efforts. Governments, NGOs and environmental organizations are leveraging GIS and remote sensing technologies to gain insights into environmental trends and make informed decisions. The emphasis on sustainability is also leading to the development of green infrastructure and the adoption of renewable energy sources, both of which rely on geospatial data for planning and implementation.

Public-private partnerships (PPPs) are playing a crucial role in the growth and development of the geospatial industry. Governments are increasingly collaborating with private companies, research institutions and non-profit organizations to develop and deploy geospatial solutions for public good. These partnerships are enabling the sharing of resources, expertise and data, leading to the development of innovative solutions in areas such as disaster management, urban planning and infrastructure development. PPPs are also helping to bridge the gap between public sector needs and private sector capabilities, driving the commercialization of geospatial technologies.

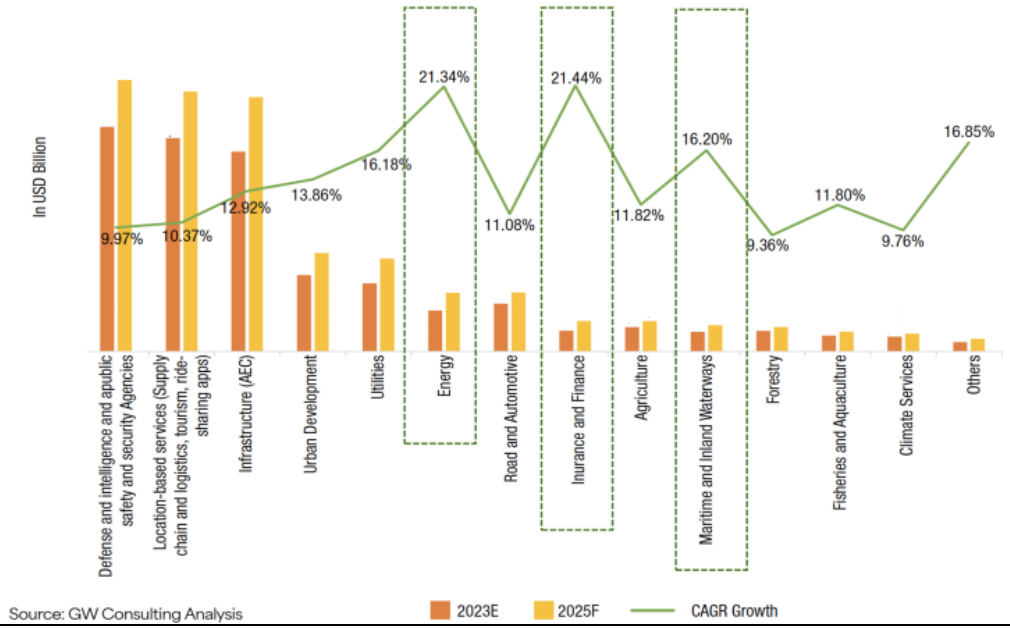
The explosion of big data is creating new opportunities for geospatial analytics, which involves the analysis of spatial and temporal data to uncover patterns, trends and relationships specially in the cloud environment. Geospatial analytics is being used in a wide range of applications, from market analysis and customer segmentation to environmental monitoring and disaster response. The integration of geospatial data with other big data sources, such as social media, sensor networks and transactional data, is enabling more comprehensive and predictive analysis. As organizations increasingly seek to harness the power of big data, the demand for geospatial analytics is expected to grow.

The geospatial industry is becoming increasingly globalized, with growing collaboration between countries, international organizations and multinational companies. Initiatives such as the United Nations' Global Geospatial Information Management (UN-GGIM) are fostering international cooperation in the development and use of geospatial technologies. These collaborations are helping to address global challenges, such as climate change, disaster risk reduction and sustainable development. The globalization of the geospatial industry is also leading to the exchange of knowledge, technology transfer and the development of international standards.

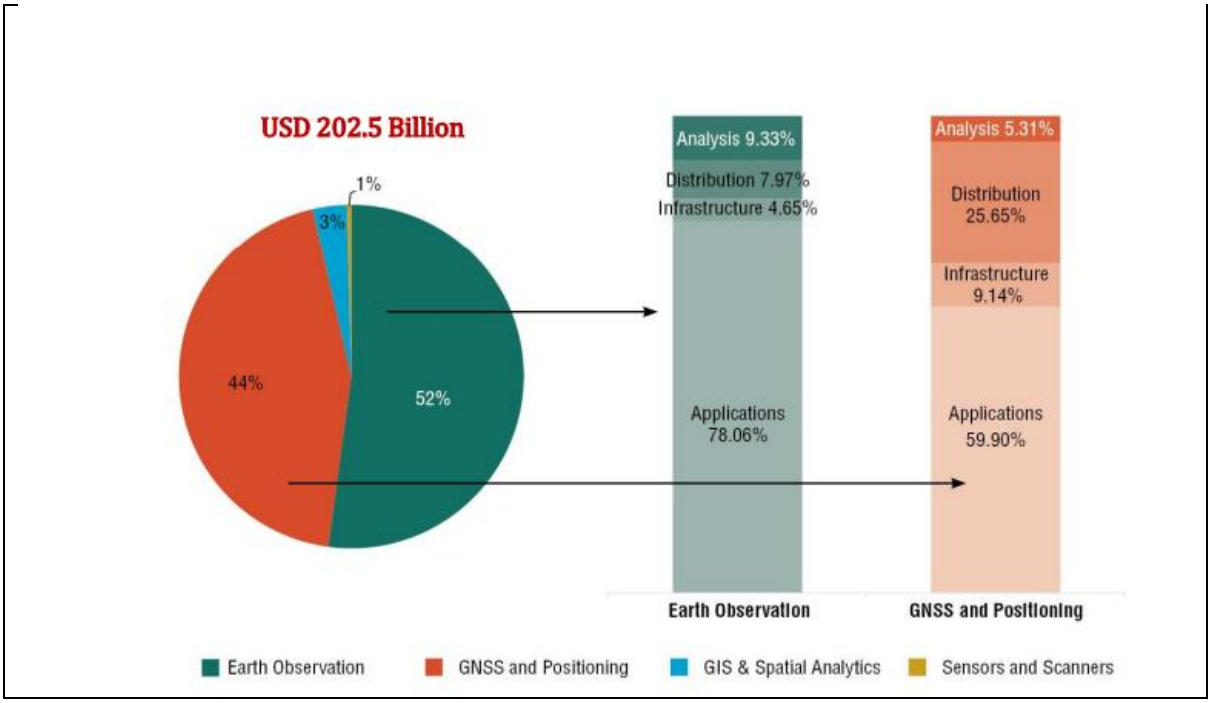
Global Geospatial Market Size and Forecast: 2023-2030:-



Sectoral Geospatial Market Size and Forecast: 2023-2025



Past trend Investments (including IPO and SPAC) in Global Geospatial and Space Industry (2019-2022).



Direct Economic Impact Of Geospatial Information And Technology: Global

Segment	Value
Infrastructure	$0.66-$1.44 Tn
Utilities	$0.10-$0.87 Tn
Location-based Services	$0.36-$1.16 Tn
Energy	$0.09-$0.42 Tn
Agriculture	$0.06-$0.34 Tn
BFSI	$0.05- $0.12 Tn

Sources:-

https://geospatialworld.net/consulting/gw-market-insights/?p=181930
efaidnbmnnnibpcajpcglclefindmkaj/https://geospatialworld.net/consulting/gki-phase-2/gw-assets/pdf/GKI-Report.pdf
www.gim-international.com/content/article/geospatial-industry-cautiously-optimistic-despite-pandemic?output=pdf
Company's Annual Report

2. Geospatial Technology and its applications

Introduction: - Geospatial technology is a term used to describe the range of modern tools contributing to the geographic mapping and analysis of the Earth and human societies. It is fundamental to fields such as cartography, remote sensing, and Geographic Information Systems (GIS). Geospatial technology offers a critical understanding of spatial configurations, interconnections, and events. Geospatial tools are crucial for tackling issues ranging from city planning and environmental protection to emergency management and transit systems. They equip decision-makers with informed, data-centric approaches and solutions.

Understanding Geospatial Technology

Geospatial Technology refers to the equipment, software, and methods used to acquire, process, and analyse data that has a geographic or spatial component. This means that the data is associated with a specific location on the Earth's surface**.**

Types of Geospatial Technology

Among the prevalent geospatial technologies are:

Technology	Explanation
Remote Sensing	- It observes distant objects or surfaces by using images and data captured from space or airborne instruments. • By analysing data from these sensors, experts can determine an object's characteristics. - Techniques include: • Aerial photographs (analog or digital) from aeroplanes and drones. • Electromagnetic waves (encompassing visible, infrared, and microwave frequencies). • Techniques like Radar and Lidar utilise radio or light signals to determine distances. - Example- Monitoring the rate of deforestation using satellite imagery.
Geographic Information Systems (GIS)	- GIS is a system designed to collect, organize, visualize, and interpret geographic data for specific Earth locations. • It layers this data to produce spatial analyses, maps, or 3D visuals. - By revealing data insights like patterns and relationships, GIS aids in informed decision-making. • Its applications span across conservation, disaster response, business, health, law enforcement, and more. - Example - Use of technology in Urban planning and development. thereby, ensuring sustainable and efficient growth.
Global Positioning System (GPS)	- GPS is a satellite-based navigation system that provides location, speed, and time data. It operates on the principle of Trilateration, indicating that at least three satellites are needed for precise location determination. -Each satellite narrows down a location's potential position. - Example- Real-time route optimization for traffic control.

Application of Geospatial Technology: -

1. Navigation and location-based services

Remember the last time you used a navigation app to find the fastest route to your destination? That's geospatial technology at work. Location-based services, powered by GPS and GIS, provide real-time navigation, helping us reach our destinations efficiently.

2. Urban planning and development

In the realm of urban planning, geospatial technology is a game-changer. Planners use GIS to analyse land use, population density, and infrastructure to make informed decisions about city development. This ensures sustainable growth and optimal resource allocation.

3. Disaster management and emergency response

Geospatial technology is instrumental in disaster management. From monitoring natural disasters like hurricanes and earthquakes to coordinating emergency response efforts, GIS and remote sensing aid in understanding, predicting, and mitigating the impact of disasters.

4. Utilities management

The management of utilities such as water, electricity, and gas benefits significantly from geospatial technology, particularly those with asset inspection tools. GIS helps utilities companies optimize infrastructure placement, monitor network performance, and respond swiftly to outages or maintenance needs.

5. Environmental monitoring and conservation

Researchers and conservationists utilize geospatial technology to monitor changes in the environment. Remote sensing data helps track deforestation, study biodiversity, and assess the health of ecosystems, contributing to effective conservation strategies.

6. Mining and resource exploration

Geospatial technology plays a vital role in the mining industry. It assists in site selection, resource exploration, and environmental impact assessment. GIS helps mining companies optimize extraction processes while minimizing ecological disruption.

7. Construction and infrastructure development

In the realm of construction, geospatial technology aids in project planning, site analysis, logistics management and construction progress reporting. GIS facilitates the identification of suitable locations for construction projects, optimizing the use of available space and resources.

8. Precision agriculture

In agriculture, precision is key. Geospatial technology enables farmers to optimize crop yields by analyzing soil conditions, monitoring crop health, and managing resources more efficiently. This leads to sustainable farming practices and better food production.

9. Facilities maintenance

Geospatial technology is employed in facilities and maintenance to streamline operations and enhance efficiency. GIS assists in asset management, allowing organizations to track and maintain facilities, plan maintenance schedules, and respond promptly to issues.

10. Business intelligence and marketing

Businesses leverage geospatial technology for market analysis and strategic decision-making. Retailers use location data to identify potential customer demographics and optimize the placement of stores. This targeted approach enhances marketing efforts and improves customer engagement.

11. Healthcare planning

In the healthcare sector, geospatial technology aids in planning and resource allocation. GIS helps map the distribution of healthcare facilities, identify areas with high healthcare needs, and optimize the placement of medical services for better community health outcomes.

Data collection

The first step involves collecting data. This can be done through various means, including satellite imagery, aerial photography (such as using drones), GPS devices, and ground surveys. Each method provides different types of data, and the combination of these sources enhances the accuracy and richness of geospatial information.

Data processing and analysis

Once the data is collected, it undergoes processing to clean and organize it. This can also involve imagery being stitched together into outputs such as orthophotos for better understanding of the site or location. Geospatial software like Birdi then analyzes the spatial relationships within the data. This can involve overlaying different layers of information to identify patterns, relationships, and trends.

Visualization

After analysis, the results are visualized in Birdi or other geospatial software. Visualization is a crucial aspect of geospatial technology as it makes complex spatial data accessible and understandable to a wide audience. This visual representation aids in decision-making processes.

Decision making and action

Informed decisions and reporting are made based on the analyzed and visualized geospatial data. Whether it's planning a new road, responding to a natural disaster, or optimizing business operations, geospatial technology provides the foundation for strategic decision-making.

Application Geospatial technology in Indian context:

1. AGRICULTURE

a. **Agri-business Solutions: Solving Tricky Problems of Over/Under Estimation**:
Skymet, one of India's largest private sector weather stations uses weather forecasting geospatial tools to provide a wide range of services like crop estimation, agribusiness solutions, crop-loss estimation studies, crop cutting experiments and crop insurance.

b. **Better Nutrient Management on Standing Crop Using GPS Data Logger**:
Green Seeker developed by Trimble has an optical hand-held sensor and GPS data logger attached to it. The product tries to find a solution to the rampant use of nitrogen by farmers that is causing soil degradation and underground water pollution.

2. DISASTER MANAGEMENT

a. **Countrywide Fire Hazard and Risk Analysis for Revamping the Fire and Emergency Services in India:**
RMSI (a global GIS consulting company) conducted a detailed Global Positioning System (GPS)-based field survey of India's entire civil fire infrastructure and also conducted a detailed GIS-based fire hazard and risk analysis to develop a Web GIS-based Fire Decision Support System (FDSS). This tool is helping the Fire Cell of NDRF & CD (Civil Defense) as well as Fire and Emergency Directorates of all the States and UTs of the country in revamping fire and emergency services.

b. **Flood Inundation Modelling using UAVs at Guntur, Andhra Pradesh**:
ideaForge (the drone start-up) deployed its VTOL NETRAv2 drone (Unmanned Aerial Vehicle, UAV) for Andhra Pradesh to assess and simulate the damage that took place after the area experienced above average or heavy rainfall. It produces a high-resolution photographic simulation of the town's surrounding geography and terrain at progressing levels of flooding and asses the area of land that could be affected or would be inundated.

c. **GIS- & GPS-Based Emergency Response System for Smart Cities:** State-of-the-art Emergency Response System known as Rolta GeoCAD (also known as Computer-aided Dispatch or Dial 100 systems) is deployed in the modern police control rooms of smart cities. Geospatial Technologies constitute one of the important components of this system. Geospatial coordinates of an incident location, point of interest or surveillance area provide the field responders and the control room operators in attending to the emergencies/surveillance effectively and accurately.

3. INTERNAL SECURITY

a. **Integrated Web GIS-based Crime Investigation System for Railway Passenger Safety:**
M P Council of Science & Technology (MPCST) and the Government Railway Police (GRP) are developing Web GIS-based applications for quick and effective crime investigation. It includes several modules such as Call Detail Records analysis, Visitor Location Register analysis, geo-tagged mapping of temporary hiding places of criminals along with the photographs of these places and attributes, digitization of criminal records of notified criminals and geotagging of their known residences along with ground photographs, passenger reservation dump data analysis, mapping of railway tracks, stations etc. All these tools are integrated into a single platform known as Crime Investigation System.

4. INFRASTRUCTURE

a. **Geospatial Data Modelling for Creation of Web-Portal Services for Industrial and Infrastructure Development under GOiPLUS in Odisha**:
Geo-informatics, ICT and space technology have been used to create the Web-GIS-based Odisha Land Bank for industrial and infrastructure development. High-resolution ortho-images, georeferenced digital datasets, NIC Bhulekh data, satellite-derived spatial datasets and attribute datasets of the industry department were seamlessly put together to create the Web-GIS-based interactive portal for Odisha Industry information and Land Bank services.

b. **Integrating UAVs in Social Research:** Village profiling was achieved spatially through transect walks, aerial mapping using UAVs, through a pilot study undertaken at Bhora Khurd, a village of Haryana, to explore the potential of geospatial data and t use of geospatial technology in social research. It allows access to inaccessible geographies which remain beyond the purview of door-to-door enumeration which can now be gauged, mapped, and produced on visual platforms to understand resource-oriented gaps and eventually lead to better governance.

c. **Innovative use of LiDAR Technology for Smart City Surveillance:**
Genesys International developed innovative solutions based on LIDAR technology for safety and security planning in Smart Cities with a CCTV-based surveillance system where Genesys provided the required feasibility tool with 3D models of the real-world objects.

d. **eLoc - India's First National Digital Address System:**
eLoc is a standardized and precise pan-India digital address system. What Aadhaar has done for the identification of individuals, this system does it for the addresses. It is a 6-character-based code - a unique identifier that precisely locates any address.

5. NATURAL RESOURCES

a. **Mapping Technologies help Indigenous Communities Preserve access to Water Resources and Biodiversity**:
Keystone (a Non-Government Organization) uses GIS-based data and mapping to gather and analyse a library of information and build action plans to preserve water resources and biodiversity. It has used mapping technologies to support initiatives that protect springs and wetlands; promote sustainable livelihoods; help indigenous people gain title to traditional lands, and improve access to water for 4,000 families.

b. **Sujal - NRW Management for Jalgaon Municipal Council**:
Maharashtra Sujal Nirmal Abhiyan (MSNA) is a reform-led programme which aims to achieve 24x7 water supplies as per the central government guidelines with a focus on water conservation. It includes a scope of accountability mechanisms like theft, and leakages, and promotes the judicious and equitable distribution of available water to all consumers while extending access to water to all residents. GIS development and mapping tools are used for the project.

6. RAILWAYS

a. **Drones, Data and the Indian Railways:**
Indian Railways, with an aim to introduce technological solutions for project management and monitoring, employed AIRPIX to avail UAV solutions for their 25-km-long Seawoods-Belapur-Uran project. The solution included data capturing using UAVs and data analytics to derive insights about the project status.

b. **LiDAR Scanning for Railway Infrastructure**:
The research project was initiated at IIT Roorkee for providing the Ministry of Railways with insights into India's current railway infrastructure and recommendations for improvements on the tracks, signalling, stations and

terminals. Laser scanning technology (FARO Laser Scanner Focus3D X Series) is used for this purpose.

7. ROADS & HIGHWAYS

a. **Road Asset Management System for National Highways:**
National Highways Authority of India (NHAI) has taken up the Road Asset Management System (RAMS) project with the World Bank's assistance. Under this project, the software is being developed to collect location-based data for more than 200 attributes of the road.

b. **Integrating Disruptive Solutions with Traditional Survey Tools for efficient Project and Stakeholder Management:**
Karnataka is a blessed state of the Indian subcontinent that is endowed with a variety of natural resources ranging from a long useable coastline to dense evergreen forests. In order to ensure the maximum utilization of these resources for economic growth, the state has undertaken a comprehensive development drive to improve the road network, especially in its less urbanized areas. Differential GPS and Unmanned Aerial Vehicles tools were employed for the study.

c. **Tamil Nadu Highway Department (TNHD) e-Pathai Project:**
TNHD envisioned e-Pathai as a web-based GIS to assist them to rationalize decision-making in planning, programming, funding, procurement and in the allocation of resources in the road sector in order to make the best use of public funds in preserving the road networks.

8. TRANSPORTATION

a. **Ground-up Approach for Solving Local Transportation Issues: The transportation** application Ola was developed as a way to aggregate the highly scattered personal transportation offerings into a single system that was efficient, reliable, scalable and affordable; through the use of geospatial technologies.

b. **GIS-Based School Bus Tracking:**
Consciousness and concern for the safety of their children among parents is increasing in urban India. A smart Bus is a tool that employed the application of Mobile and location-based technologies to monitor and track school buses from anywhere anytime. Information Alerts about the arrival and departure of a school bus and exact geo-location and ETA used to be shared with the parents.

c. Indian oil corporation Limited (IOCL) uses the technology to transport large quantities of petroleum products between its supply depots and retail outlets. The process of identifying the shortest transport routes on all-weather

motorable roads for delivering its products is automated using geospatial technology. The solution also provides digital tools for managers to verify and approve the selected routes. Early assessment of the implemented solution indicates cost and time savings, better management and increased convenience to the Company.

9. UTILITIES

a. **Mapping technologies utilised for urban planning to improve sanitation for India's urban poor**:
Many of the urban poor lack access to a basic sanitary resource: a toilet. One Home One Toilet was implemented by Shelter Associates to solve this problem. The project combines data and GIS to map slums' infrastructure, showing the homes which do not have individual toilets or access to communal ones and then facilitating the installation of household toilets, improving sanitation, health, and quality of life.

b. **Modernization of Utility Mapping using High-end GNSS:**
Municipal Corporation of Greater Mumbai (MCGM) is using the Mumbai Base Map digitized by the National Informatics Centre (NIC) with ArcGIS systems to manage their utilities. MCGM departments employed the GNSS system to update the maps from time to time.

Sources:-

http://ficci.in/spdocument/20873/Geospatial%20Technologies%20in%20India%20-%20Success%20Stories.pdf.
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3. Indian Geospatial Industry present scenario

Introduction:-

The Indian geospatial industry is undergoing a transition from data to knowledge, and from being a service to a solutions industry, supported by the significant policy reforms announced by the Government of India in 2021. While India has been at the forefront of the geospatial applications and services globally, the geospatial industry is finally bullish about the possibilities that exist today with respect to geospatial technology and its adoption across national programs and initiatives and this is very much reflective of the strategic growth happening within the ecosystem, the partnership and mergers and acquisition trends, rise of new geospatial startups, and the gradual expansion of geospatial export services to the world.

India's total geospatial market forecasted to be INR 37.16 thousand crores by 2025.

India's total geospatial market (including both domestic and export market) is estimated to be worth approximately INR 27.65 thousand crores in 2022, rising from INR 22.94 thousand crores in 2019, at a CAGR of 6.43 percent.

With the enabling policy environment, and the gradual transition of the industry to offer services and solutions to worldwide market, India's total geospatial market is forecasted to rise to INR 37.16 thousand crores by 2025, growing at a CAGR of 10.35 percent between 2022 and 2025.

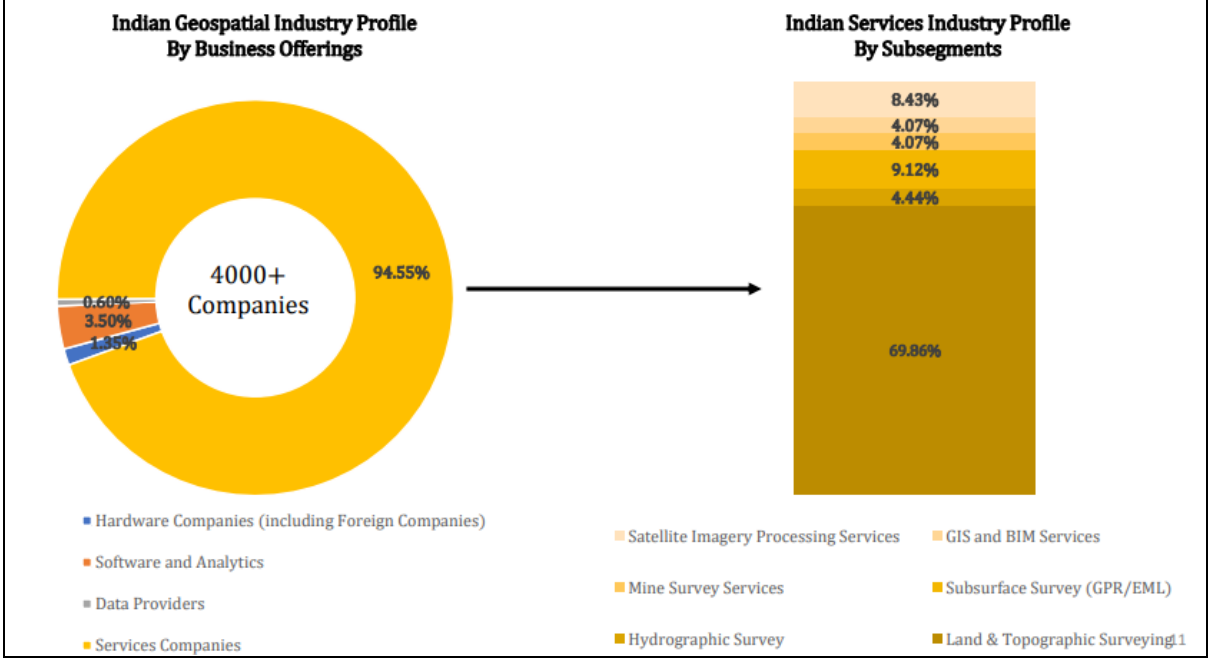
Growth driver for Indian Geospatial Industry:-

- India's swift and continued economic recovery to 90 percent of the pre-pandemic levels, and transition towards digitalization to drive geospatial adoption.
- Critical announcements by the Government of India for liberalization and democratization of geospatial data – particularly, the Guidelines for Geospatial Data 2021, and the Drone Rules 2021 is already seeding future of the Indian geospatial market.
- Indigenous growth of geospatial solution companies such as MapMyIndia, Magnasoft, Esri India, NeoGeoInfo Technologies, to name a few, are competing with global players and building a successful Indian geospatial ecosystem with significant investments in technology and content management.
- Increasing interest and showcase of intent by global geospatial industry players (Trimble, Hexagon, FARO, Topcon Positioning, etc.) to import hardware equipment's (Total Stations, LiDAR, GNSS sensors, etc.) within the Indian ecosystem; developing software, APIs and applications, low-cost data processing and image processing services; establishing research and development (R&D) centres to develop solutions in the areas of deep learning,

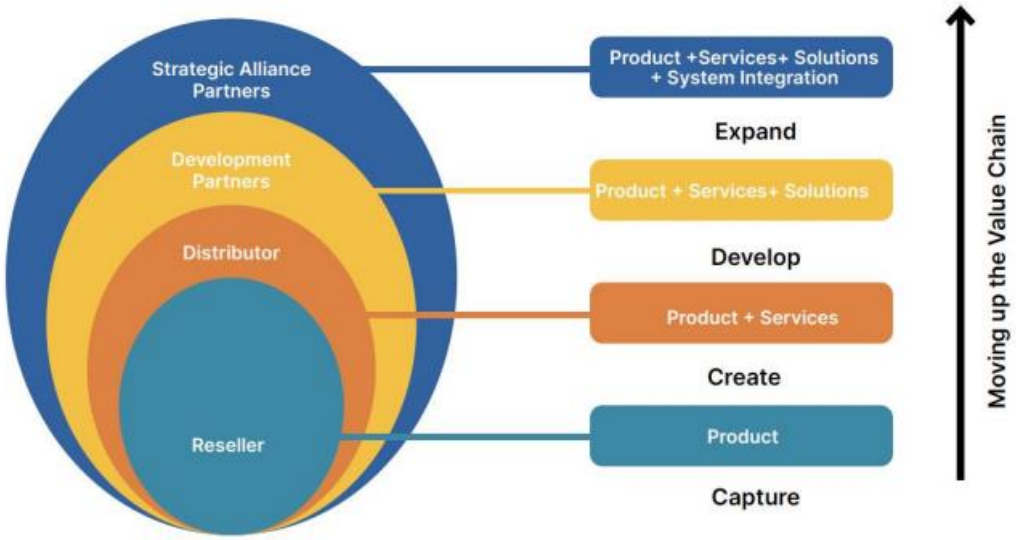
GeoAI solutions, cloud, big data analytics; among other things, will enhance domestic capability and capacity.

- Strategic push by the Government of India to adopt the latest technologies (including geospatial information and technology) across national mission-mode projects to achieve the vision of five trillion-dollar economy by 2025; with an aim to simultaneously improve productivity, efficiency, and efficacy across all economic sectors contributes to geospatial market growth.

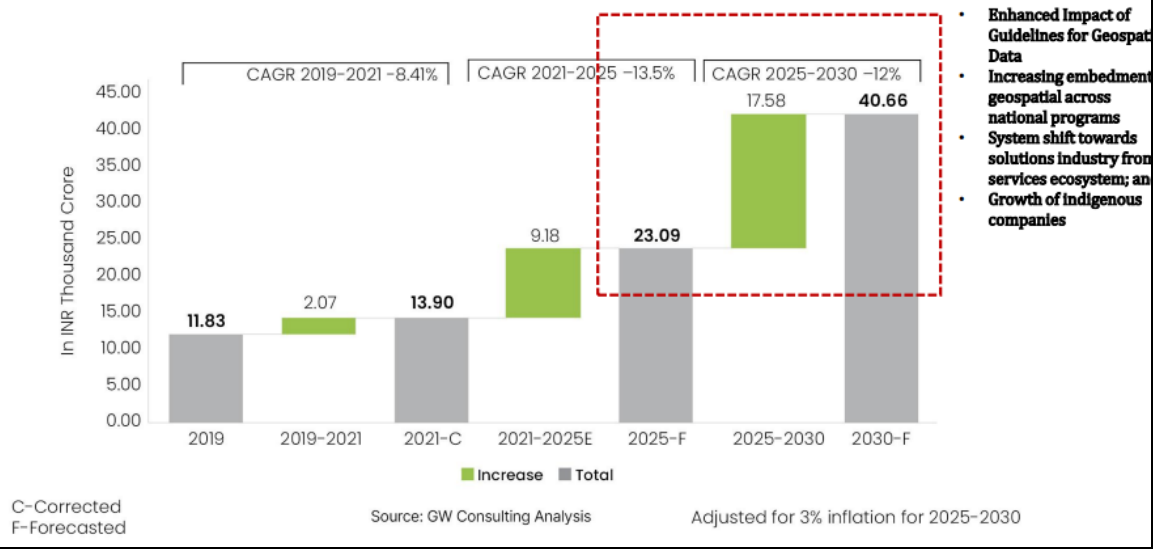
INDIAN GEOSPATIAL INDUSTRY PROFILE:-



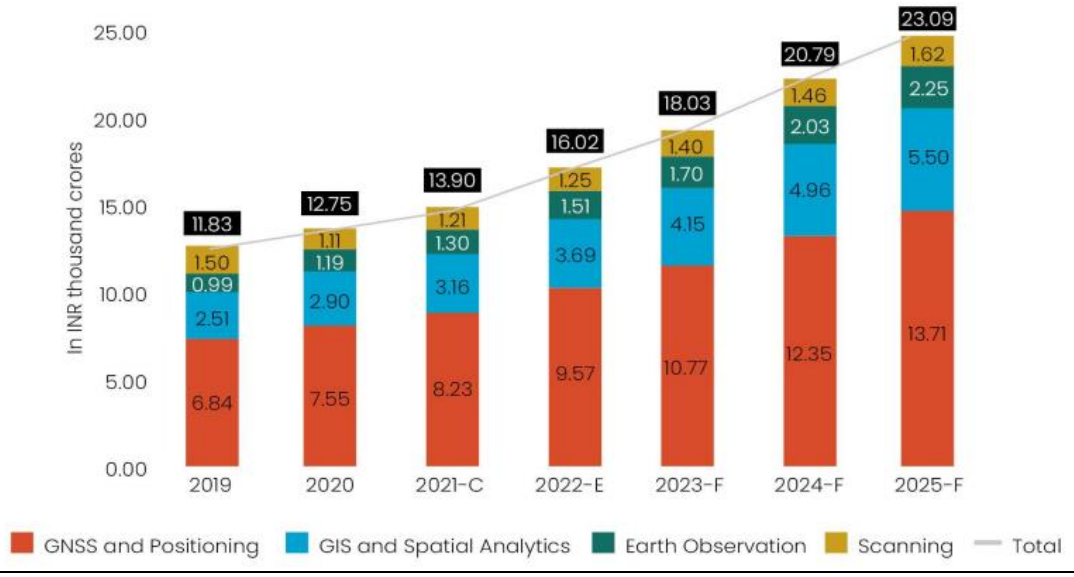
INDIA'S GEOSPATIAL INDUSTRY: FROM SERVICES TO SOLUTIONS THE FUTURE



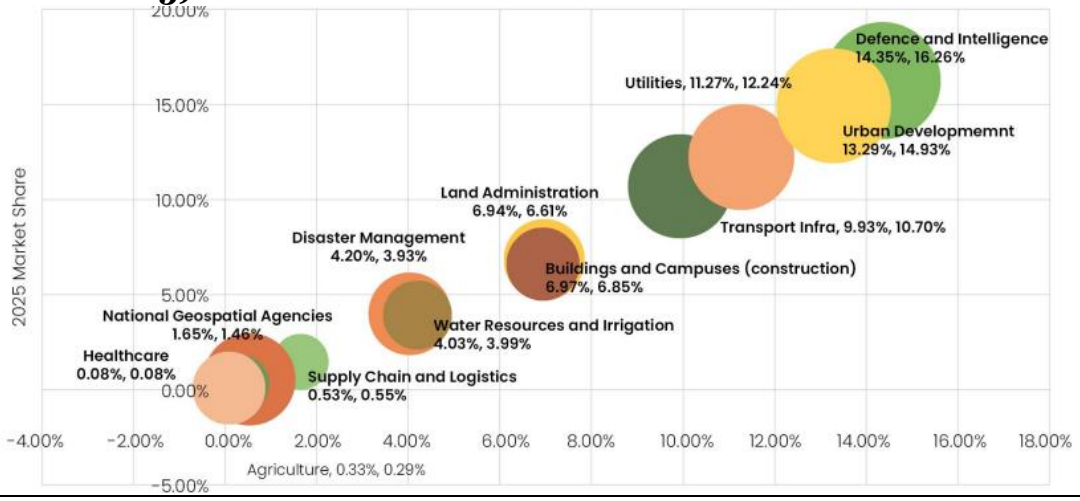
INDIAN GEOSPATIAL MARKET SIZE AND FORECAST 2019-2030



INDIAN GEOSPATIAL MARKET SIZE AND FORECAST (2019-2025): BY TECHNOLOGY SEGMENTS



INDIAN GEOSPATIAL MARKET: BY SECTORAL MARKET SHARE (2022 & 2025)

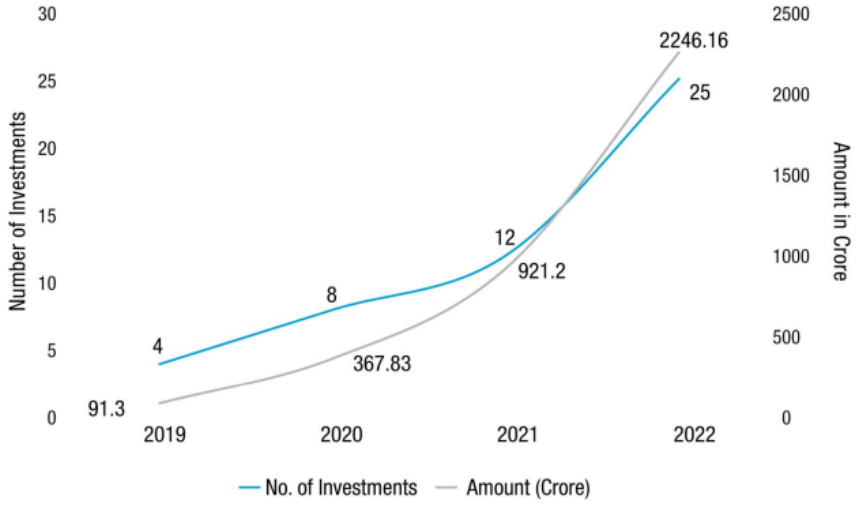


Funding and Investment Trends within Indian Geospatial (and space) Companies from 2019-2022

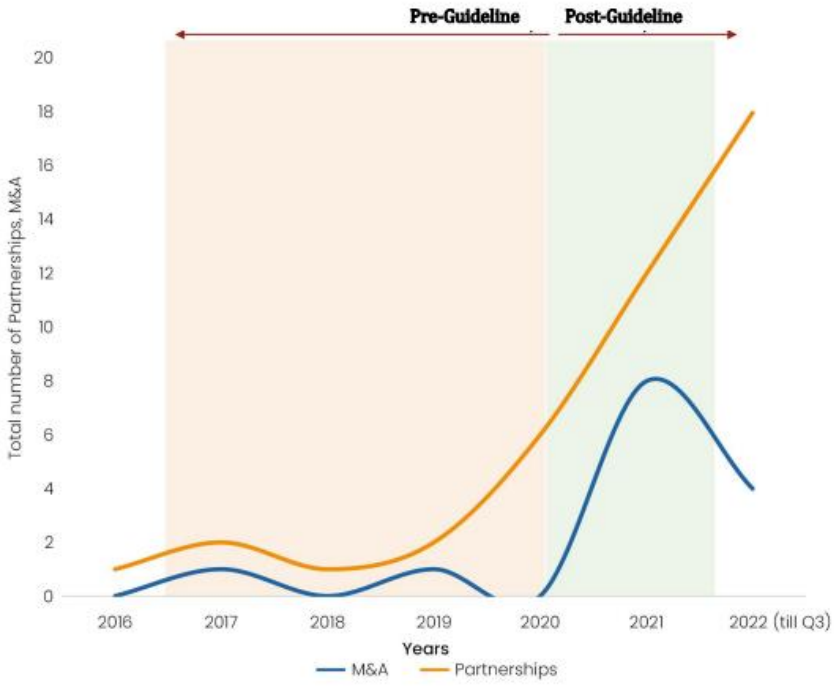
49
NO. OF INVESTMENTS FROM 2019 TO 2022

3626.49 Cr
AMOUNT RAISED FROM 2019-2022

98
TOTAL NUMBER OF INVESTORS



Mergers and Acquisitions and Partnership Trends within Indian Geospatial Industry



Government Initiative and GIS Industry in India

Over the past year, the Indian government has made significant strides in promoting the geospatial industry, particularly through policy reforms, public-private partnerships and the integration of Geographic Information Systems (GIS) in various national and State government driven initiatives. These efforts are aimed at harnessing geospatial technology to drive economic growth, improve governance and address critical challenges such as urbanization, environmental conservation and disaster management.

One of the most notable developments in the past year has been the liberalization of India's geospatial data policy. In February 2021, the government introduced new guidelines that drastically simplified the collection, generation, dissemination and use of geospatial data. This reform marked a paradigm shift from the earlier restrictive policies, opening up the sector to private players, including startups and enabling them to freely access and share geospatial data without requiring prior approvals or licenses. The new policy is designed to accelerate the growth of the Indian geospatial industry, promote innovation and reduce the dependency on foreign data sources. In line with these policy changes, the Indian government has also launched several initiatives to integrate GIS into key developmental projects. The National Geospatial Policy (NGP) as published in the year 2022 is being developed to provide a comprehensive framework for the development and use of geospatial data across sectors. This policy aims to enhance India's geospatial capabilities, promote the use of GIS in governance and support the development of indigenous geospatial technologies.

Another significant initiative is the expansion of the Digital India program, which now includes a strong focus on geospatial technology. The government has been actively promoting the use of GIS in areas such as land records management, urban planning and infrastructure development. The Svamitva Scheme, launched by the Ministry of Panchayati Raj, where air borne based surveys and GIS are being used to create digital maps of rural properties. This initiative is expected to streamline property rights, reduce disputes and enhance rural governance.

Another flagship program of the Government is GatiShakti with its focus on multi-modal connectivity. The GatiShakti platform leverages geospatial and digital technologies, including Geographic Information Systems (GIS) and satellite imagery, to provide a comprehensive and dynamic mapping of infrastructure projects. This digital platform serves as a centralized repository of information, offering real-time data on various projects and enabling better decision-making. It allows for the identification of bottlenecks, efficient resource allocation, and timely interventions, ensuring that projects are completed on schedule and within budget. The initiative

aims to integrate different modes of transportation—such as roads, railways, waterways, and airways—into a cohesive network that facilitates the seamless movement of goods and people across the country. This integration is expected to significantly reduce the time and cost associated with logistics, thereby boosting economic growth and making Indian businesses more competitive.

In the realm of environmental management, GIS has become a critical tool for the Ministry of Environment, Forest and Climate Change (MoEFCC). The ministry has been using geospatial technology to monitor forest cover, assess biodiversity and manage natural resources. The Green India Mission, part of the National Action Plan on Climate Change, leverages GIS to plan and monitor afforestation and reforestation activities across the country. The integration of GIS in disaster management has also gained momentum. The National Disaster Management Authority (NDMA) has been using GIS to enhance disaster preparedness, response and recovery. The government has been deploying geospatial technology for flood mapping, earthquake risk assessment and cyclone tracking. These efforts have significantly improved the country's ability to mitigate and respond to natural disasters.

In addition to these initiatives, the Indian government has been fostering public-private partnerships to advance the geospatial industry. Collaborations between government agencies, research institutions and private companies have led to the development of innovative geospatial solutions and the commercialization of indigenous technologies. The government has also been supporting the startup ecosystem, with initiatives such as the Atal Innovation Mission and the Geospatial Startups Program, which provide funding, mentorship and market access to geospatial startups.

Over the past year, India's participation in international geospatial forums has also increased. India has been actively engaging with global organizations such as the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) and the Open Geospatial Consortium (OGC). These engagements have helped India align its geospatial policies with global standards and best practices while also promoting Indian geospatial products and services in the international market.

Source:-
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Annual Report Genesys International Corporation Ltd

4. Challenges and opportunity

While the market outlook for the geospatial industry is highly positive, there are challenges that need to be addressed. Data privacy concerns, the need for skilled professionals and the integration of geospatial data with other emerging technologies such as IoT and AI are some of the challenges that the industry will need to overcome. However, these challenges also present opportunities for innovation. The development of new data security protocols, training programs for geospatial professionals and the creation of interoperable platforms that integrate geospatial data with other technologies can further drive the growth of the industry. The geospatial industry is on the cusp of a major transformation, with significant growth expected in both global and Indian markets. The convergence of technologies, the increasing importance of spatial data in decision-making and supportive government policies are all contributing to a dynamic and rapidly expanding geospatial market. As the industry continues to evolve, it will play an increasingly critical role in shaping the future of various sectors, driving economic growth and addressing global challenges.

Governments at all levels are increasingly using geospatial technology to enhance governance and improve service delivery. GIS is used for land records management, tax collection, public safety and resource management. The ability to visualise and analyse spatial data helps governments make informed decisions, optimize resource allocation and improve transparency. As governments continue to embrace digital transformation, the use of geospatial technology in governance is expected to expand.

The geospatial industry is at the forefront of technological innovation, offering a wide array of opportunities that have the potential to drive significant economic growth, enhance governance and improve societal outcomes. The rapid advancements in technology, coupled with the increasing demand for spatial data across various sectors, have opened up numerous avenues for growth and innovation. With the global trend towards urbanization, there is a growing need for Digital Twin solutions that can address the challenges of infrastructure management, resource allocation and service delivery. Geospatial technology plays a critical role in the development of smart cities by providing tools for urban planning, traffic management, waste management and environmental monitoring. Governments and municipalities are increasingly relying on GIS and 3D mapping to optimize land use, monitor infrastructure health and improve the quality of life for urban residents. Geospatial technologies are essential tools for disaster management and climate change mitigation. Governments and organizations use geospatial data and tools to monitor natural hazards, assess vulnerabilities and plan response strategies. The ability to predict and respond to disasters such as floods and landslides can save lives and minimize economic losses. Additionally, geospatial data is critical for monitoring environmental changes, tracking deforestation and supporting conservation efforts, making it a vital component of global climate change initiatives.

Geospatial technology is playing a key role in the planning, design and maintenance of infrastructure projects. From roads and bridges to utilities and telecommunications networks, GIS and 3D modelling are used to optimize design, monitor construction progress and ensure the efficient use of resources. The ongoing investment in infrastructure development, particularly in emerging economies, presents significant opportunities for geospatial companies to provide solutions that enhance project efficiency and sustainability. The transportation and logistics sector is heavily dependent on geospatial technology for route optimization, fleet management and supply chain management. GPS-based navigation systems, realtime traffic monitoring and location-based analytics are essential tools for improving efficiency and reducing operational costs. The growth of e-commerce, coupled with the demand for faster and more reliable delivery services, is driving the adoption of geospatial solutions in this sector.

The agriculture sector presents significant opportunities for the application of geospatial technologies. The defence and security sector is a major user of geospatial technologies. Geospatial intelligence (GEOINT) is crucial for military operations, surveillance, reconnaissance and border security. The ability to map and analyse terrain, monitor enemy movements and assess potential threats gives defence forces a strategic advantage. The increasing complexity of modern warfare, coupled with the need for real-time intelligence, is driving the demand for advanced geospatial solutions in the defence sector. The healthcare sector is increasingly recognizing the value of geospatial data for public health management.

Despite the numerous opportunities, the geospatial industry faces several challenges that could hinder its growth and development. These challenges range from technical and regulatory issues to ethical and societal concerns. As the geospatial industry relies on the collection and analysis of large volumes of location-based data, concerns about data privacy and security are paramount. Unauthorized access to or misuse of geospatial data can lead to privacy violations, identity theft and other security breaches. The industry must navigate complex data privacy regulations and implement robust data protection measures to safeguard sensitive information. Building trust with users and ensuring compliance with privacy laws are critical challenges for the industry. The geospatial industry requires a highly skilled workforce with expertise in GIS, remote sensing, data analytics and related fields. However, there is a shortage of qualified professionals, particularly in emerging markets. This skills gap can limit the industry's ability to innovate and meet growing demand. Addressing this challenge requires investment in education and training programs, as well as collaboration between industry, academia and government to build a talent pipeline for the geospatial sector.

The deployment of geospatial technologies can be resource-intensive, requiring significant investments in infrastructure, hardware and software. For many organizations, particularly in developing countries, the high cost of acquiring and implementing geospatial solutions can be a barrier to adoption. Additionally, the ongoing maintenance and upgrading of geospatial systems require continuous financial and human resources. The industry must develop cost-effective solutions and explore new business models, such as cloud-based services and subscription models, to lower the entry barriers for users. The geospatial industry is characterized by a wide range of technologies, platforms and data formats, which can create challenges in terms of interoperability and data sharing. The lack of standardized protocols and systems can hinder collaboration between organizations and limit the effectiveness of geospatial solutions. To overcome this challenge, the industry needs to work towards greater standardization, develop interoperable platforms and promote the adoption of open data standards.

The geospatial industry is highly competitive, with numerous players ranging from large multinational corporations to small startups. While competition can drive innovation, it can also lead to market fragmentation, where different companies develop incompatible systems and standards. This fragmentation can create barriers to data sharing and collaboration, limiting the overall effectiveness of geospatial solutions. The industry must work towards greater collaboration and interoperability to address this risk and maximize the value of geospatial technologies. The geospatial industry is at a critical juncture, with immense opportunities for growth and innovation across various sectors. However, the industry must navigate a range of challenges to fully realize its potential. By addressing these challenges—such as data privacy, regulatory compliance, technical issues and ethical concerns—the geospatial industry can continue to evolve, delivering valuable solutions that drive economic growth, improve governance and enhance the quality of life for people around the world. Collaboration between industry stakeholders, governments and academia will be key to overcoming these challenges and unlocking the full potential of geospatial technology in the years to come.

5. Peer Companies analysis

Company	Activities
Allterra India	Established in 2018, AllTerra Solutions LLP India is a prominent player in the geospatial industry, operating nationally with 12 Regional Offices, 6 dedicated Service Centres, and a Corporate Office in Gurugram. Specialising in tailored workflows for key infrastructure projects such as High-Speed Rail, Metro, Airport Expansion, Seismic Exploration, Highways, Defence & Defence Research, All Terra is a recognised name for its solution-centric approach. As Trimble's official partner in India, AllTerra is authorised to deliver a range of geospatial solutions using Trimble's globally acclaimed products. AllTerra's comprehensive solutions combine hardware (Total Station, GNSS, Terrestrial Scanning, etc.), data processing software, and training, making it a singular force in the Indian Geospatial Industry. AllTerra India, aligned with Trimble's forefront of innovation, is dedicated to transforming work methodologies by integrating the best GNSS and optical hardware, sensors, and software for geospatial applications, echoing our commitment to "Curating Geospatial Excellence. The Indian Way."
Esri India	Established in 1996, Esri India Technologies Pvt. Ltd. (Esri India) is an end-to-end Geographic Information System (GIS) solutions provider. As a market leader, it has successfully delivered cutting-edge GIS solutions powered by ArcGIS to more than 6500 customers for applications in Land management, Utilities, Water, Infrastructure, Retail, Insurance, Disaster Management, Telecommunications, Urban Development, Smart Cities, Forestry, Natural Resources Management and more. For Indian customers, it has engineered a unique product called Indo

	ArcGIS. Headquartered in Noida (Delhi-NCR), the company not only enjoys association with more than 6,50,000 users across the country but has also been Great Place to Work® Certified in 2021, 2022, and 2023.
Genesys International	Genesys International Corporation Ltd is a premier advanced mapping company. With a team of over 2,000 professionals and the Genesys constellation of sensors, the company is building the New India Map Stack. This innovative mapping technology stack is developed as a national digital infrastructure tailored for AtmaNirbhar Bharat. Genesys International has unique expertise, encompassing an understanding of emerging consumer applications related to mapping technology and the capability to provide cutting-edge solutions on the enterprise and government markets. Genesys has successfully carried out novel and challenging projects across varying terrains, both nationally and globally. Genesys has also worked on projects with significant social and financial impact, including vulnerable parts of society. Genesys' collaboration with the Survey of India (SOI, the country's national surveying and mapping Agency) is set to revolutionise India's map content by implementing the 3D Digital Twin Mapping Program. The Ayodhya Development Authority recently adopted Genesys' New India Map Stack as the official map of Ayodhya. We are building the Digital Twin of multiple cities in India and worldwide.
MapmyIndia	C.E. Info Systems Ltd (NSE: MAPMYINDIA; BSE: 543425) is India's leading digital mapping, geospatial software, and location-based IoT deep-tech company, offering proprietary digital maps as a service ("MaaS"), software as a service ("SaaS") and platform as a service ("PaaS"). The company provides its digital maps, software products, platforms, application programming interfaces ("APIs"), IoT, and solutions to new-age tech companies, large businesses,

	automotive OEMs, government organisations, developers, and consumers in the Indian market under the MapmyIndia brand, and in the global market under the Mappls brand. The company has served more than 2000 enterprise customers since its inception.
NeoGeoInfo Technologies	NeoGeoInfo Technologies is a 15-year-old, 200+ people strong SEI CMM Level3 Solutions and Services Provider in Geospatial Technologies with rich experience in system integration and development and in providing engineering solutions. NeoGeoInfo is proficient in Cognitive Technologies (AI/ Machine Learning/ Robotic Process Automation), Analytics, and developing solutions using web/ mobile apps. NeoGeo provides complete Solutions in the Geospatial sector from MAP (Satellite Imagery/Stereo processing, UAV, LiDAR Data collection as well as processing, Field Data collection), MODEL (Extracting knowledge from the data collected from the field, AI/ML, domain data superimposition and other services), and MANAGE (Developing Geospatial Applications on Arc Platform, Opensource and Mobile applications, Data management, etc.) NeoGeoInfo is focused on ULB Level Governance Solutions (Property Tax, Digital Door Numbers, Land Resurvey Projects, Cadastral Map Digitization, Town Planning, Smart Cities and Surveillance) and Cross Country Infrastructure /Utilities projects (Highways, Telecom/ OFC, Gas/ CGD, Power Transmission, Water Networks). NeoGeoInfo Technologies is featured as one of India's Top 10 most promising GIS companies by various magazines and rating agencies.
Secon	SECON Private Limited is a 41-year-old CMMI Level 3, ISO 9001:2015, ISO 27001:2013, and NABL ISO/IEC 17025:2017 accredited company with its corporate office in Bangalore and regional offices across India. SECON is a Geospatial and Multi-discipline Engineering Consulting company

	providing comprehensive solutions in Water Resources, Highways, Railways, Cross Country Energy Pipelines, Water Supply & Public Health Engineering, etc. SECON products and services include GIS-based software applications, Photogrammetry & LiDAR processing, Remote Sensing, and GIS development. The comprehensive service offerings of SECON in each of the above domains range from feasibility studies, survey & data acquisition, investigations, planning, design, construction management, software development and innovative geospatial solutions. SECON has adopted innovative methodologies and grown its client base extensively in North America, Canada, Europe, and Australia. Way back in 2009, SECON utilized 50cm resolution stereo satellite data to conduct systematic GIS analysis for the identification of suitable locations of medium & minor irrigation projects and preparation of DPR for Narmada Valley Development Corporation (NVDA).
Scan Point Geomatics Ltd	Scanpoint Geomatics Limited (SGL) pioneers the nation's geospatial domain through IGiS (Integrated GIS & image processing Software), an indigenous technology in partnership with ISRO that brings GIS, Image Processing, Photogrammetry, and CAD together on the same platform under the Make in India Initiative. SGL offers a multitude of solutions based on IGiS in domains like Urban development & Smart Cities, Land Records, Agriculture, forest and environment, Defence and homeland security, water resources, utilities, geology and mining, disaster management, etc. We follow a framework-based approach while offering virtualised solutions focused on enabling customers to exploit the power of integrated geospatial for sustainable cities and communities, efficient management of clean water supply, water distribution management

	and sanitation, and holistic land administration, to name a few. SGL also offers IGiS – MDMS (Metadata Management System), a geospatial data collaboration framework for stakeholders like the Government, Citizens, Private enterprises, NGOs, etc., to share, analyse and consume heterogeneous data as a service.
Excel Geomatics	Excel Geomatics is a geospatial data creation, data modelling, and web-based GIS and IT solution provider company based in Noida, India. The core team of Excel Geomatics has more than 25 years of experience in providing data and solutions based on various geospatial technologies. Excel Geomatics has already developed several Mobile App-integrated Web-based GIS and IT solutions to help a wide range of customers efficiently manage their projects in the domains of Agriculture, Forestry, Telecom, Urban Mapping and Planning, including Smart City, Disaster Management, Flood Early Warning Systems, Water Resources, Defence, Infrastructure planning and monitoring, Smart Village, Geo-marketing etc. To date, Excel Geomatics has reached out to clients in approximately 30 countries across the globe, including many in Africa, where it helps in the field of food security, livelihood development, hazard zonation to managing their revenues by the introduction of Digital Taxa Collection systems and Web-GIS based Property Tax Collection System.
GSL Associates	GSL Associates Private Limited ("GSL") is India's leading geospatial solutions provider, delivering high-quality solutions through its in-house team of geospatial experts and strategic corporate partnerships with South Africa, Australia, Belgium & Sweden. GSL is a market leader in India in utility inspection in the power sector of EHV transmission lines. By using various sensors and Aerial platforms, GSL is able to provide the owner with a comprehensive report that can be used for asset management and

	risk mitigation. GSL specialises in aerial ortho imagery and LiDAR solutions enabling infrastructure planning and development (such as High-Speed Rail Corridors) for the client.

6. Government Initiatives

In 2022, **MINISTRY OF SCIENCE AND TECHNOLOGY** introduced the **NATIONAL GEOSPATIAL POLICY**, 2022 wide notification no. [No. SM/25/07/2021 (E-33381)] dated 28th December,2022. The Union Cabinet, in its meeting held on 16.12.2022, approved the National Geospatial Policy, 2022.

Vision and Goals

- To make India a World Leader in Global Geospatial space with the best in the class ecosystem for innovation.
- To develop a coherent national framework in the country and leverage it to move towards digital economy and improve services to citizens.
- To enable easy availability of valuable Geospatial data collected utilizing public funds, to businesses and general public.
- To have a thriving Geospatial industry in the country involving private enterprise.
- Following are the milestones in the journey towards realization of the aforesaid vision:

Future Timelines of policy:-

Year 2025

- Put in place an enabling policy and legal framework that supports liberalization of Geospatial sector and democratization of data for enhanced commercialization with Value Added Services.
- Improve availability of and access to better location data across organizations and sectors to enable innovations and encourage enterprise.
- Establish and strengthen an integrative interface for all digital data having location dimension collected or developed utilizing public funds, for easy access, sharing, use and reuse.
- Redefinition of National Geodetic Framework using modern positioning technologies and provision of online access.
- High accuracy Geoid for the entire country.
- Develop and strengthen national and sub-national arrangements in Geospatial information management and related infrastructures with participation of government, industry, private sector, academia and civil society.

Year 2030

- High resolution topographical survey & mapping (5-10 cm for urban & rural areas and 50 cm-100 cm for forests & wastelands).
- High accuracy Digital Elevation Model (DEM) for entire country (25 cm for plain, 1-3 metre for hilly and mountainous areas).
- Develop a Geospatial Knowledge Infrastructure (GKI) underpinned by Integrated Data and Information Framework.
- Enhance capabilities, skills and awareness to meet the future needs of the country.

Year 2035

- High resolution/accuracy Bathymetric Geospatial Data of inland waters and topography of shallow/deep seas - to support Blue Economy.
- Survey and mapping of sub-surface infrastructure in major cities and towns.
- National Digital Twin of major cities and towns.

Strategy and Approach

The focus of the Policy is to make Geospatial technology and data as agents of transformation for achieving the Sustainable Development Goals (SDGs), bringing efficiency in all sectors of economy and instilling accountability and transparency at all levels of governance.

Role of Private Sector

While there are nodal Ministries/Departments for each of the National Fundamental Geospatial Data Themes, this does not imply that the entire work has to be necessarily done departmentally or through SoI or only government/public sector entities. Actual collection and collation of data and development of Data Themes would be increasingly done with private sector participation consistent with February, 2021 Guidelines. Needs and requirements of the citizens related to various Geospatial/location-based solutions will predominantly be serviced by the private sector, with SoI and nodal ministries/agencies of various Geospatial Data Themes in a facilitative role. The Private Sector will play a key role in creation and maintenance of Geospatial and mapping Infrastructures, innovations and process improvements and monetization of Geospatial data.

Geospatial Data Promotion and Development Committee (GDPDC)

GDPDC shall be the apex national body for formulating and implementing appropriate guidelines, strategies and programs for promotion of activities related to collection,

generation, preparation, dissemination, storage, publication, updating and/or digitization of Geospatial data along with associated products, solutions and services. It shall take measures to foster innovation, provide leadership and coordination, and promote standards necessary to strengthen Geospatial information management so that they can be used to find sustainable solutions to emerging development and security challenges facing the nation. DST shall be the nodal Department of the Government and GDPDC shall make suitable recommendations to DST in this regard as detailed below:

Budget 2025

Budget 2025, National Geospatial Mission (NGM) announced to modernize land records

Benefit Under NGM

- National Geospatial Mission is expected to significantly impact various sectors
- It will directly affect urban development and land management
- The initiative aims to address challenges related to land disputes

Finance Minister Nirmala Sitharaman announced the launch of a National Geospatial Mission in the Budget 2025-26. The mission will be aimed at modernizing land records and enhancing urban planning across India. This initiative will leverage the existing PM Gati Shakti framework to develop foundational geospatial infrastructure and data, facilitating improved design and execution of infrastructure projects. The global geospatial market is looking at a remarkable expansion, with projections indicating a surge to $1,064 million by 2030.

The announcement of the National Geospatial Mission is a promising move towards modernizing India's infrastructure and technological capabilities. By leveraging cutting-edge technologies like AI and quantum computing, the mission is expected to drive advancements in areas such as agriculture, transportation, and climate monitoring,"

By creating a robust geospatial database, the government aims to streamline processes involved in land reforms, making them more efficient and transparent. This move is anticipated to benefit not only government agencies but also private stakeholders, including geospatial and drone companies, which will likely see increased demand for their services.

Sources:-

https://www.indiatoday.in/science/story/budget-2025-national-geospatial-mission-announced-to-modernise-land-records-2673253-2025-02-01.

7. Future outlook Geospatial Industry

The market outlook for the geospatial industry, both globally and in India, is highly optimistic, driven by rapid technological advancements, increasing demand for location-based services and growing integration of geospatial technologies across various sectors. The industry is expected to witness robust growth over the next decade, with significant opportunities emerging from sectors such as urban planning, agriculture, transportation, defence and environmental management. As per Grand View Research, the global geospatial analytics market size was valued at USD 85.77 billion in 2022 and is expected to grow at a compound annual growth rate (CAGR) of 12.6% from 2023 to 2030.

India's geospatial market is poised for significant growth, driven by the government's progressive policies, increased adoption of geospatial technology across sectors and a vibrant startup ecosystem. As per Mordor Intelligence, the Indian geospatial analytics market is estimated to grow from USD 1.21 billion in the current year to USD 2.42 billion by 2029, at a CAGR of 14.82% during the forecast period. The liberalization of the geospatial data policy in 2021 has unlocked new opportunities for the Indian geospatial industry. The government's focus on digital transformation, smart cities and infrastructure development is driving the adoption of GIS and other geospatial technologies. Initiatives such as the Digital India program, Smart Cities Mission and the Svamitva Scheme are expected to generate substantial demand for geospatial services and solutions. Sectors such as agriculture, urban planning, transportation and defence are increasingly adopting geospatial technologies in India. Urban planners are leveraging GIS for efficient land use planning and infrastructure development, while the defence sector continues to invest in geospatial intelligence for national security.

The Indian government is actively fostering public-private partnerships (PPPs) to advance the geospatial sector. Collaborations between government agencies, research institutions and private companies are leading to the development of innovative geospatial solutions tailored to the Indian context. These partnerships are expected to accelerate the commercialization of indigenous technologies and expand the reach of geospatial services in the country. India is increasingly engaging with global geospatial organizations and markets, positioning itself as a key player in the global geospatial industry. Indian companies are exploring export opportunities for geospatial products and services, particularly in regions such as Southeast Asia, Africa and the Middle East. International collaborations are also helping Indian firms to enhance their technological capabilities and expand their global footprint.

Union Finance Minister Nirmala Sitharaman on 01 February, 2025 announced a Rs 100 crore National Geospatial Mission to develop foundational geospatial infrastructure and data, a move aimed at modernizing land records, aid urban planning and promoting earth observation systems. Government will start a National Geospatial Mission to develop foundational geospatial infrastructure and data. Using

PM Gati Shakti, this mission will facilitate modernization of land records, urban planning, and design of infrastructure projects," Sitharaman said. The finance minister allocated Rs 100 crore for the National Geospatial Mission. The announcement of the mission was welcomed by the geospatial industry that said it would be crucial for building smarter cities, with data-driven insights. The National Geospatial Mission, leveraging the PM Gati Shakti initiative, will develop foundational geospatial infrastructure and data which will further enhance the utility of satellite technology for public and national development.

Best Regards,

T.G Uday Associate Director,

M/s Infomerics Analytics & Research Pvt Ltd

Date: 08-09-2025

Place: -Delhi