

1. DRONE MANUFACTURING IN INDIA

At the National Defence Industries Conclave (2026), Defence Minister of India has emphasised that India must develop a self-reliant drone manufacturing ecosystem to strengthen its defence preparedness

1.Introduction

1. Unmanned Aerial Vehicles have emerged as a disruptive technology transforming both civilian and military domains.
2. Their integration with artificial intelligence, automation, and advanced communication technologies has significantly enhanced their operational capabilities.
3. For India, drones represent not only an economic opportunity but also a strategic imperative in the context of evolving warfare and security challenges.

2.Understanding Drones and Global Market Trends

Concept and Functional Features

1. A drone is an unmanned aircraft operated either remotely or autonomously using onboard systems and sensors.
2. It forms part of an Unmanned Aircraft System, which includes the drone, ground control station, and communication links.
3. Drones can perform diverse functions such as surveillance, mapping, delivery, precision agriculture, and combat operations.

Global Market Expansion

1. The global drone market is valued at over 30 billion dollars in 2025 and is expected to grow to nearly 90–100 billion dollars by 2030.
2. This growth is driven by advancements in artificial intelligence, data analytics, and 5G-enabled real-time communication.
3. Increasing adoption across sectors such as defence, agriculture, logistics, and disaster management is accelerating market expansion.

3.Drone Ecosystem in India

Institutional and Regulatory Development

1. India has developed a structured drone ecosystem with over 38,500 registered drones and nearly 40,000 certified remote pilots.
2. Around 244 approved training organisations contribute to capacity building and skill development in the sector.
3. The Directorate General of Civil Aviation plays a central role in regulating drone operations and certification.

Integration into Governance and Development Programmes

1. Drones are increasingly used in flagship schemes such as SVAMITVA for rural land mapping and property record digitisation.
2. In agriculture, drones are used under PMFBY for crop assessment and insurance claim verification.
3. Their use improves efficiency, transparency, and accuracy in governance.

4.Why Drones are Central to Modern Warfare

Enhanced Tactical Capabilities

1. Drones enable precision strikes with minimal collateral damage, improving operational effectiveness.
2. They reduce the risk to human soldiers by performing high-risk missions in hostile environments.
3. Their cost-effectiveness compared to traditional military assets makes them widely deployable.

Intelligence, Surveillance and Reconnaissance Role

1. Drones provide real-time intelligence and situational awareness through high-resolution imaging and data transmission.

2. They enhance battlefield decision-making and coordination.
3. Persistent surveillance capabilities allow monitoring of enemy movements and border activities.

Role in Asymmetric Warfare

1. Drones empower smaller states and non-state actors to challenge technologically superior adversaries.
2. Their low cost and accessibility make them tools for unconventional warfare.
3. This has increased the complexity of modern conflict scenarios.

Strategic Importance of Indigenous Capability

1. Dependence on foreign drone technology can create vulnerabilities during geopolitical conflicts.
2. Indigenous manufacturing ensures strategic autonomy and supply chain security.
3. It aligns with India's broader objective of defence self-reliance.

5. Government Initiatives in the Drone Sector

Regulatory Reforms and Liberalisation

1. The Drone Rules, 2021 provide a simplified regulatory framework covering registration, certification, operation, and penalties.
2. The Drone Airspace Map has classified nearly 90 percent of Indian airspace as a green zone for low-altitude drone operations.
3. The Drone Amendment Rules, 2022 removed the requirement of a drone pilot license, easing entry barriers.

Promotion of Domestic Manufacturing

1. The Production Linked Incentive scheme provides financial incentives to boost domestic drone manufacturing and value addition.
2. The Drone Import Policy, 2022 restricts import of fully built drones while allowing import of components to encourage domestic production.
3. The Drone Certification Scheme, 2022 simplifies type certification processes for manufacturers.

Taxation and Digital Ecosystem Support

1. GST on drones has been reduced to 5 percent to promote adoption and affordability.
2. Digital platforms and regulatory mechanisms have improved transparency and ease of compliance.
3. These measures collectively support a conducive business environment.

6. Key Challenges in Drone Manufacturing

Dependence on Critical Imports

1. India relies on imports for key components such as semiconductors, sensors, and propulsion systems.
2. Global supply chains are concentrated in a few countries, creating strategic and economic risks.

Technological Capability Gaps

1. India faces limitations in advanced areas such as AI-based autonomous navigation and swarm technologies.
2. Challenges exist in developing miniaturised components and advanced materials.
3. Secure communication systems and anti-jamming capabilities require further innovation.

Regulatory and Ecosystem Constraints

1. Testing infrastructure and certification facilities are still evolving.
2. Integration of drones into civilian airspace remains complex due to safety concerns.
3. Coordination between multiple agencies can slow down innovation.

7. Way Forward

Strengthening Indigenous Innovation

1. Increased investment in research and development is essential to bridge technological gaps.
2. Defence corridors and innovation hubs should be leveraged to promote startups and MSMEs.
3. Collaboration between academia, industry, and defence institutions should be enhanced.

Improving Procurement and Policy Framework

1. Simplification of defence procurement procedures can accelerate adoption of indigenous drones.
2. Long-term policy stability is required to attract private investment.
3. Public-private partnerships can play a key role in scaling production.

Developing Counter-Drone Capabilities

1. India must invest in counter-drone technologies such as electronic warfare systems and directed energy weapons.
2. These systems are essential to address threats from hostile drones and ensure national security.

Building Robust Supply Chains

1. Domestic manufacturing of critical components must be prioritised.
2. Diversification of supply chains can reduce dependence on specific countries.
3. Strategic reserves of essential components may be considered.

Conclusion

Drones have fundamentally transformed modern warfare and governance by enhancing efficiency, precision, and situational awareness. For India, achieving self-reliance in drone technology is crucial for both economic growth and national security. With sustained policy support, technological innovation, and institutional strengthening, India can emerge as a global leader in the drone ecosystem while ensuring strategic autonomy in an increasingly technology-driven world.

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