KPMG

FICCI

AMMO India 2024

Make in India – Make for the world

August 2024

Foreword FICCI

Modern military armaments, smart weapon systems, and platforms often showcase a nation's strategic capabilities. Ammunition, a crucial component of these systems, plays a vital role in ensuring the state's objectives are adequately met on the battlefield. With rising global defence spending and supply & demand constraints, the global ammunition industry continues to play a vital role in the modern battlefield and remains a strategic asset for any country.

Today, India is proactively leading the narrative of finding smart and cost-efficient military solutions with the help of cutting-edge technologies and indigenously developed capabilities, and ammunition is no exception. Therefore, it is important for the Indian defence industry to advance its efforts to produce quality ammunition for the arms and weapon platforms used by Indian tri-services and CAPFs. The global ammunition market size was estimated at INR1,29,260 crores[1] (USD15.5 Bn)[1,2], in 2023 and is expected to reach INR1,34,173 crores[1] (USD16.0 Bn)[1] in 2024. Increasing geopolitical uncertainties and supply chain disruptions started exposing opportunities for Indian companies to explore the global ammunition market and supply chains.

As shared by Hon'ble Raksha Mantri during the previous edition of AMMO India, "The development of ammunition is crucial not only for security but also for the country's socio-economic progress. For India to become a world power and one of the leading countries in defence production, we must move forward in the indigenous design, development & production of ammunition." It is imperative that the Indian industry aligns its strategy to ensure that India's stake in the global arms market reaches 30 per cent by 2047 in this 'Amritkaal'. The government of India has taken several steps to boost ammunition manufacturing, such as the introduction of the 5th Positive Indigenisation list and the Indian armed forces introducing measures to minimise the import of ammunition to achieve 'Raksha Aatmanirbharta'.

AMMO India 2024 aims to deliberate jointly on all these aspects and facilitate the exchange of ideas to leverage the opportunities through indigenous R&D and collaboration with partners from friendly foreign countries. The report prepared by FICCI and KPMG in India shares insights on the ammunition industry in India and globally and suggests the way forward to gain technological advancements through collaborative research and strategies. Thereby enabling the vision of 'Make in India – Make for the World'. I hope all the stakeholders in government and industry will benefit immensely from this document.

Vinod Sahay

Chair

FICCI Defence and Homeland Security Committee

1. IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).
2. Conversion rate: 1 USD = INR83.61 (as on 16 July 2024).

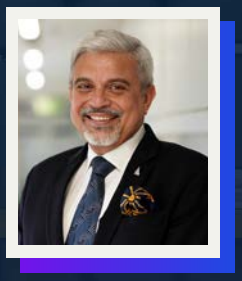
Foreword KPMG in India

The last few years have seen major conflicts erupt across the world and the implications are here for us to witness. As countries flex their military power to defend their sovereignty, neighbouring nations continue to proactively take measures by investing in defence infrastructure and improving their capabilities to defend their borders. A large portion of these defence investments have been allocated for procurement of ammunition and weapon systems. As of March 2024, the European Union Commission had allocated INR4,485 crore[1] (USD537.2 Mn)[1] to ramp up ammunition production, aiming to strengthen their defence industry. This narrative is true across the globe, and which has led to an increased impetus towards the ammunition industry.

In India, the push towards self-reliance and focus on modernisation of the armed forces have long pointed towards having the state-of-the-art weapon systems. This argument forms the basis for indigenisation and a steady progress in the last few years, especially in the realm of ammunition.

We are proud to showcase to our readers the strides that our nation is making within the ammunition industry, driven by a vision to reduce dependence on imports. In this report, we will look at the industry in relation to the global context, the market dynamics at play, the challenges we face and the opportunities that exists for our country across the ammunition value chain.

We, at KPMG in India, remain steadfast in supporting India's indigenisation journey towards self-reliance is a collective effort, requiring the dedication and ingenuity of all stakeholders. As we move forward, let us remain committed to the vision of a self-reliant India, where our capabilities are built on the foundation of strength and innovation.



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Executive summary

The ammunition market is integral to the global defence industry, underscoring its importance for national security and military efficacy. This report dives into the global ammunition landscape with a special focus on India, highlighting current trends, challenges, and opportunities for growth.

Globally, the demand for ammunition is estimated at INR1,29,260 crores[1] (USD15.5 Bn)[1] in 2023 and is expected to grow to INR184,092 crores[1] (USD22.0 Bn)[1] in 2032, at a CAGR of 3.95 per cent[1] over the next decade. Geo-political conflicts, increase in the military spending and rising insurgency are the primary reasons for this growth. We observe that nations are taking proactive measures to secure their borders as regional conflicts boil over. With increased demand, the global ammunition supply is set to increase and become efficient with the advent of robust technologies.

Shifting our focus to India, we argue that the Indian ammunition market is at a pivotal juncture. We estimate the demand for the Indian ammunition market to be at INR7,057 crore[1] (USD844.0 Mn)[1] in 2023, which is 5.5 per cent[1] of the global ammunition industry. However, it's poised to grow at a faster CAGR of 4.93 per cent[1] over the next decade i.e., a delta of ~1 per cent over global growth, driven by, stockpile replenishment and the "Make in India" initiative. In this regard, the Indian ammunition sector is a fertile ground to boost indigenisation. However, the ammunition market cannot be viewed in isolation as itis embedded within the ecosystem comprising regulatory environment, access to technology, etc. which shapes its growth and progress. In this report, we critically analyse these factors and their interplay to delineate the challenges and the opportunities that exist.

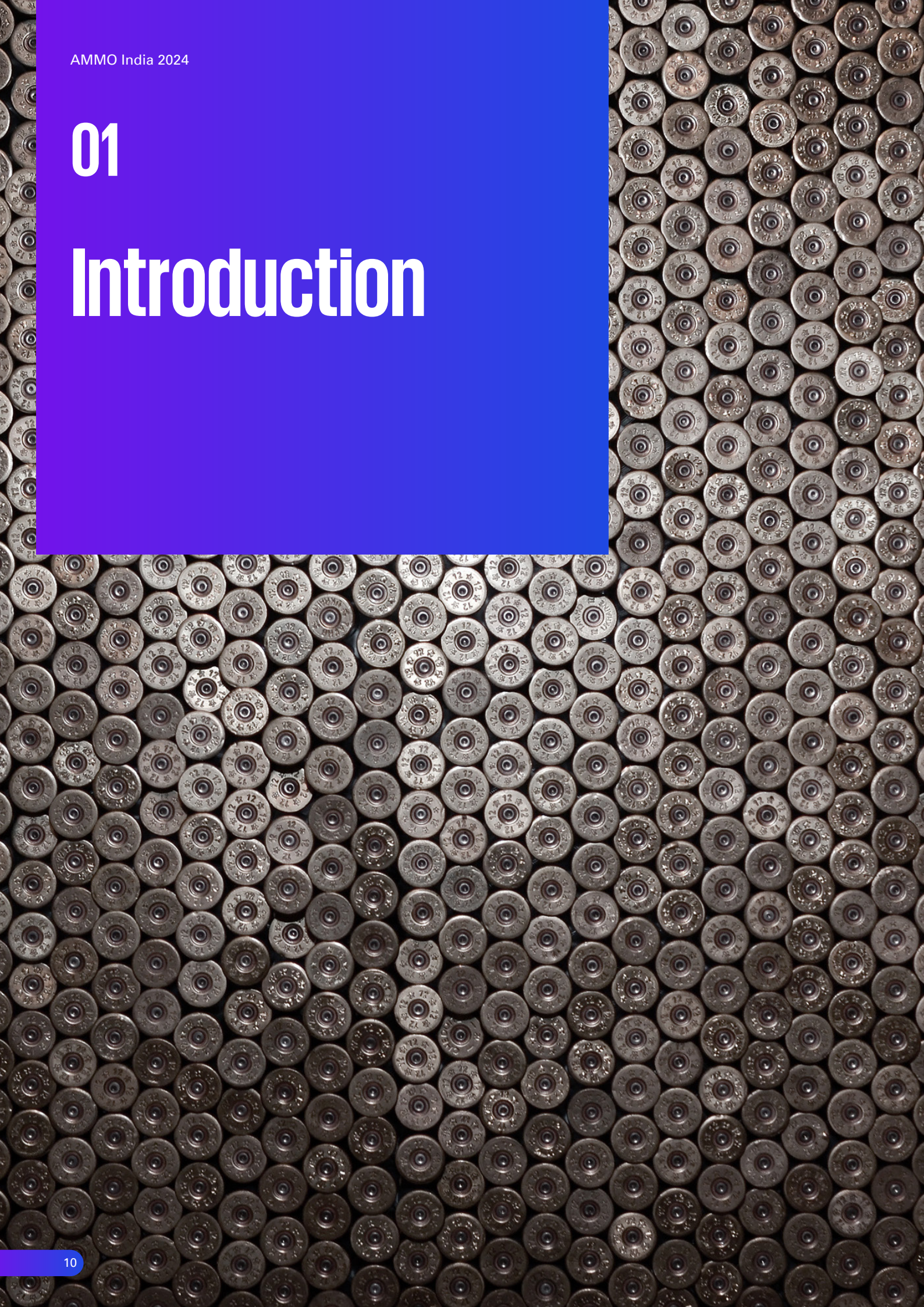
1. IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

Finally, the report outlines steps for the growth of India's ammunition production capabilities. There is a clear need for increased investment in Research and Development (R&D), improved financial incentives to attract foreign players for access to technology and a short- to long-term plan on identifying export opportunities. Such measures will dictate India's right to win at the centre stage of the global ammunition industry and increase its soft-power and global relevance for years to come.

As India continues to focus on self-reliance and innovation, the future of its ammunition market looks promising, ready to meet both domestic and global defence needs. This optimistic outlook reflects a nation on the precipice of significant advancements, poised to make substantial contributions to the global defence landscape.

01

Introduction



The rapidly evolving geopolitical landscape has resulted in the increased demand for ammunition both globally and within India, which is driven by regional conflicts, and the proposed modernisation efforts of the armed forces worldwide.

Globally, the ammunition industry is grappling with a significant demand-supply gap. Many countries like the ones in Europe find their domestic production capacities stretched thin, unable to keep pace with the rising need for advanced weapons. This inadequacy is particularly notable in regions experiencing high-intensity conflicts and those investing heavily in defence upgradation programs. The reliance on imports to bridge this gap has become a common strategy, which highlights the global interdependence in defence supplies.

India, too, faces a similar scenario where the demand for ammunition has been on an upward trajectory, driven by border skirmishes, internal security issues, and push towards modernisation. Presently India's domestic manufacturing capabilities are not adequate to meet the demand, which necessitates imports.

While this dependency on foreign suppliers poses risks and an economic burden on the defence exchequer, it simultaneously opens opportunities for investment in the domestic ammunition manufacturing sector. By enhancing production capacities and nurturing technological advancements within the country, India can reduce its reliance on imports and build a self-sufficient defence ecosystem.

Ammunition types

Based on its usage and design, ammunition can be broadly categorised into:

Small calibre

(<14.7 mm)

- Small-calibre ammunition comes in a wide range of calibre sizes including 5.56 mm, 7.62 mm, 9 mm, and 12.7 mm.
- 5.56 X 45 mm NATO ammunition is the commonly round used by the Indian armed forces as well as the paramilitary forces.
- 7.62 X 51 mm NATO as well as the 12.7 X 99 mm NATO are used for precision firing, machine guns and single shot rifles.
- 9mm and .38 calibre, 0.45 ACP are the most used pistol calibre round by both the military as well as law enforcement.
- Other calibres such as the 7.62 X 39 mm are used for Soviet origin rifles such as AK 47s.

Small arms, fixed/mobile mounted platforms

Medium calibre
(20 mm – 60 mm)

- Medium-calibre ammunition includes high-performance 20 mm, 25 mm, 30 mm, and 40 mm.
- Indian Infantry Fighting Vehicles (IFVs) primarily use 30 mm ammunition of Soviet/Russian origin, newer platforms use NATO ammunition.
- Aircraft, anti-aircraft artillery and ships use auto cannons with calibres between 20 mm – 40 mm.

Armoured vehicles, aircraft/ ships, anti-aircraft artillery

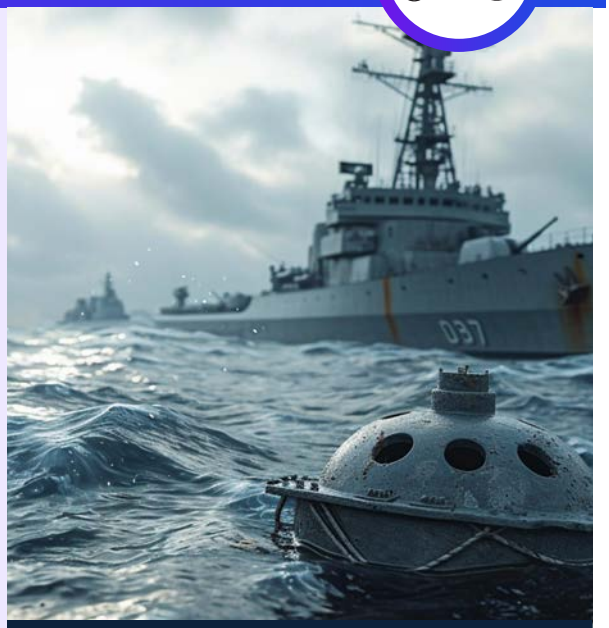
Heavy calibre
(> 60 mm)

- Heavy calibre ammunition includes ammunition of 105 mm calibre and 120 mm calibre.
- The Indian navy uses the 76 mm naval gun across its fleet of major surface combatants.
- The army is moving towards the standardisation of its artillery guns on the 155 mm calibre.

Artillery, naval guns, MBTs

Mortars, mines, grenades

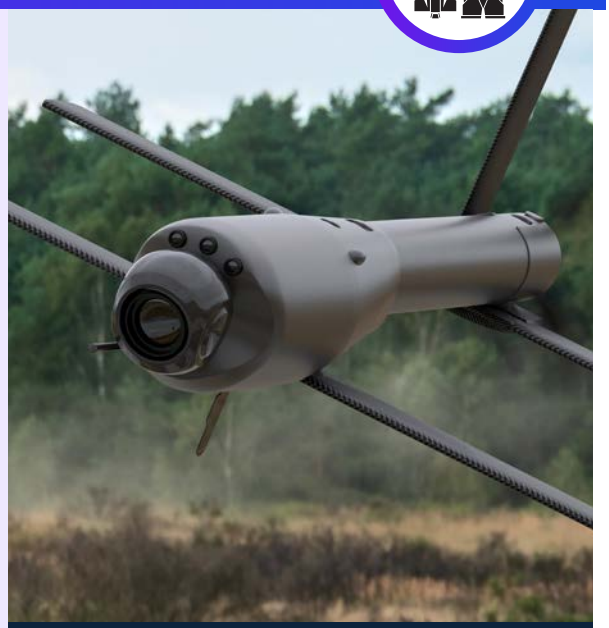
- Grenades, mortars and mines are used primarily by the infantry and Navy (naval mines).
- The grenades used for training purpose are reusable, therefore they do not get consumed upon use.
- Mortar rounds are widely used by the Infantry for training as well as for low intensity conflicts as may be the case.



Infantry/prepared positions

Loitering ammunition

- Loitering ammunition are a natural evolution of the UAV/drone ecosystem.
- Loitering munition can be manually launched (hand launched), pneumatic assisted launch, catapult launch, canister, and multi-barrel system.



Ammunition components

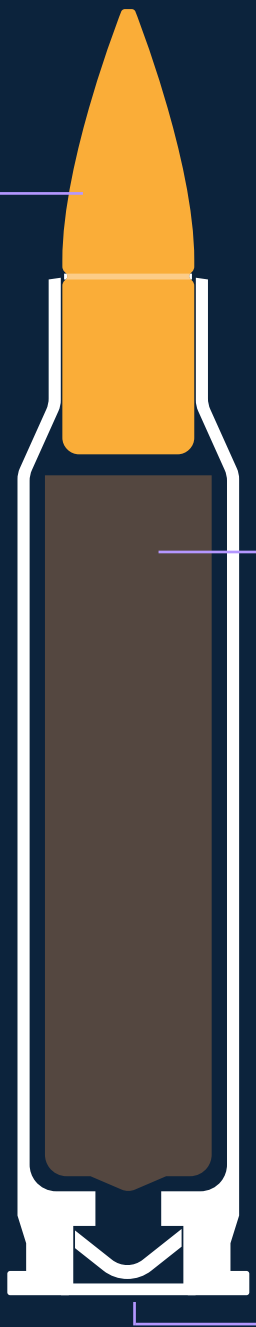
Ammunition are projectiles and propelling charges used in small arms, artillery, and other guns and weapons.

Usually, a single unit of ammunition comprises four key components i.e., cartridge case, primer, propellant, and projectile. The core components of ammunition remain consistent across calibres, although to meet the specific requirements and performance, calibres design, materials and features may vary depending on each type.

Figure 1. Components in an ammunition

Projectile

The part of the ammunition which is expelled from the weapon system to hit the intended target



Propellant

The propellant, also known as powder, is a chemical mixture that burns to create gas, causing the projectile to travel on a set trajectory.

Cartridge Case

A cartridge case is an external container made of brass, stainless steel, aluminum, etc. which houses the primer, propellant, and projectile, extending from the projectile to the firing pin area. Its primary function is to hold these components together until the ammunition is fired or disassembled.

Primer

It is a physical piece of ammunition that sets off the propellant firing the projectile. It consists of a cup, the ignition compound and the anvil. When the hammer of the weapon system strikes the primer cup, it pushes the ignition compound into the anvil, causing it to ignite. This ignition then sets off the powder, generating the high pressure needed to propel the projectile out of the casing.

Small-calibre ammunition, such as those used in handguns and rifles, generally feature compact and simple design with the above components. Medium-calibre ammunition, like those used in machine guns, have larger projectiles and quantities of propellant for increased range. Large-calibre ammunition, used for land and naval artillery have advanced propellant systems with electric components such as fuses, guided systems, etc.

Grenades and mines are typically designed for specific scenarios with integrated explosive charges and triggering mechanisms, while mortars use fin-stabilised projectile for arc firing. Loitering ammunition incorporates advanced electrical components, equipped with sophisticated guidance systems, sensors, and communication devices. These components enable real-time target acquisition and tracing, allowing the munition to loiter in the airspace for an extended period before engaging with the target.

The different types of ammunition have varied shelf lives depending on their composition, storage conditions and manufacturing processes, and must be disposed and replenished in accordance with the guidelines of the Directorate General of Quality Assurance (DGQA), which is responsible for ensuring the quality and reliability of Indian military equipment including ammunition, overseeing its testing and certification to maintain operational safety and effectiveness.

02

Global ammunition market

Overview

In recent years, global conflicts and geopolitical tensions have significantly escalated, leading to an increased demand for ammunition across the world. From regional disputes and territorial aggressions to large-scale military engagements, the need for reliable and advanced ammunition has never been more critical. Conflicts in regions such as the Eastern Europe, Middle East, and parts of Asia have particularly highlighted the urgent need for robust defence capabilities.

The rise of non-state actors and insurgency worldwide has prompted governments to strengthen their internal security measures. The law enforcement agencies are increasingly relying on advanced ammunition to combat these threats effectively.

In response to these global challenges, the ammunition industry is experiencing rapid growth. Countries are ramping up production capacities, investing in research and development and forming alliances to ensure steady supply of advanced munition. As the world navigates through an era of heightened conflicts and security concerns, the role of the ammunition industry becomes vital in safeguarding nations and maintaining global stability.

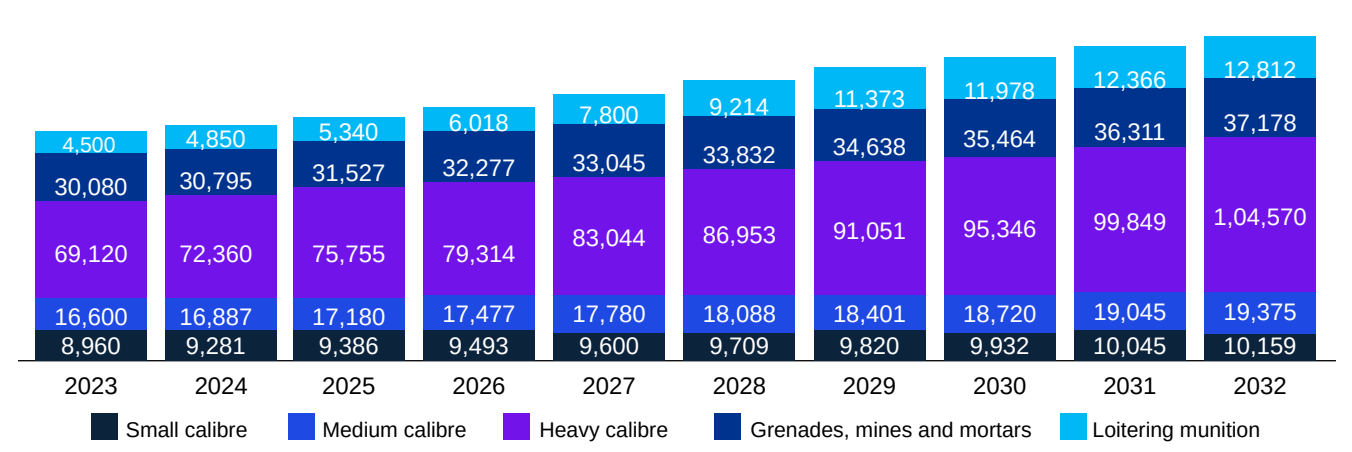
Given the industry produces a diverse range of products from small calibre bullets for handguns to artillery shells and innovative advanced ammunition, increased investments, technological advancements, and research efforts have improved performance, reliability, and safety of these products.

Global ammunition market size

The global ammunition market is experiencing substantial growth, both in terms of volume and value.

In 2023, the global demand for ammunition was pegged at INR1,29,260 crores[1] (USD15.5 Bn)[1] with heavy calibre ammunition accounting for 53.48 per cent[1] of the global demand, followed by grenades, mines and mortars at 23.27 per cent[1] and medium calibres at 12.84 per cent[1]. Fuelled by the demand drivers mentioned above, the global ammunition is expected to increase to INR184,092 crores[1] (USD22.0 Bn)[1] in 2032, increasing at a CAGR of 3.95 per cent.[1]

Figure 2. Global ammunition market – current and forecast



Source: IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

1. IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

As seen from the charts, the small calibre ammunition was an INR8,960 crore[2] (USD1.1 Bn)[2] market in 2023, and it is expected to increase to INR10,159 crore[2] (USD1.2 Bn)[2] by 2032. Additionally, the volumetric demand under the small calibre category was estimated at about 2.3 billion[2] rounds in 2023 and it is expected to grow to about 2.63 billion[2] rounds by 2032.

For medium calibre, the market stood at INR16,600 crore[2] (USD2.0 Bn)[2] in 2023, and it is expected to grow to INR19,375 crore[2] (USD2.3 Bn)[2] in 2032. The demand for various calibres under the medium calibre ammunition category was estimated to be 36.0 million[2] rounds in 2023 and it is expected to grow to about 41.9 million[2] rounds by 2032, on account of modernisation and mechanisation of armed forces.

For the global heavy calibre ammunition the consumption was estimated to be around INR69,120 crores[2](USD8.3 Bn)[2] in 2023, and it is expected to grow to INR1,04,570 crores[2] (USD12.5 Bn)[2] by 2032, increasing by about 52 per cent[2]. The demand for various calibres under the heavy calibre ammunition category was expected to be about 1.78 million[2] rounds in 2023 and is expected to grow to about 2.8 million[2] rounds by 2032.

In 2023, the global grenade, mortar, and mine demand were estimated at about 1.78 million[2] units and is expected to grow to about 2.8 million[2] units by 2032. The global demand for grenades, mines and mortars was estimated to be around INR30,080 crores[2] (USD3.6 Bn)[2] in 2023 and is expected to grow to INR37,178 crores[2] (USD4.5 Bn)[2] by 2032, an increase of 52 per cent[2].

The global demand for loitering ammunition was estimated to be about 9,450[2] units in 2023 and is expected to grow to 26,905[2] units by 2032. The loitering ammunition demand that was estimated to be around INR4,500 crores[2] (USD538.7 Mn)[2] in 2023, is primarily driven by the modernisation of the armed forces and the demonstrated usability of these platforms in foreign conflicts and this this demand is expected to grow to be around INR12,812 crores[2] (USD1.5 Bn)[2] by 2032.

2. IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

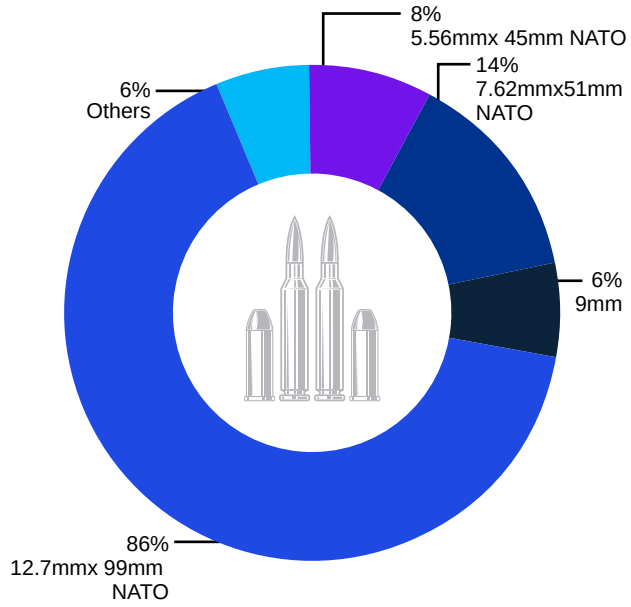
Market size by geographical regions

Small calibre

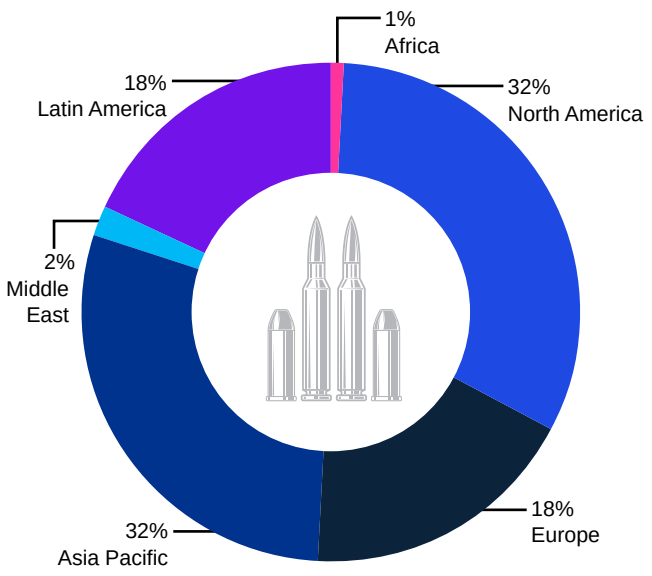
12.7 mm and 7.72mm calibre ammunition are amongst the most used small calibres as they are versatile, and account for about 80 per cent of the total demand. North America, Europe and Asia Pacific collectively account for approximately 79 per cent[3] of the demand in the year 2023.

Figure 3. Global small calibre ammunition demand, by calibre, 2023 and small calibre ammunition demand, by region 2023

Global small calibre ammunition demand, by calibre, 2023



Small calibre ammunition demand, by region, 2023



100 per cent = INR8,960 crore

Source: IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs)

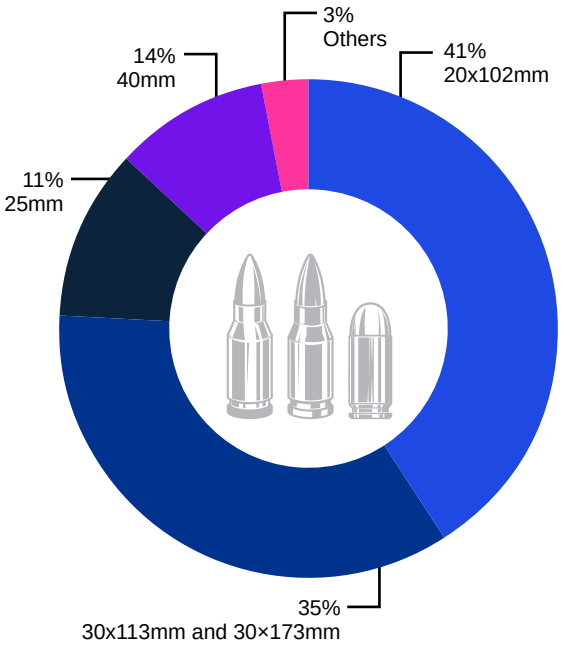
3. IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

Medium calibre

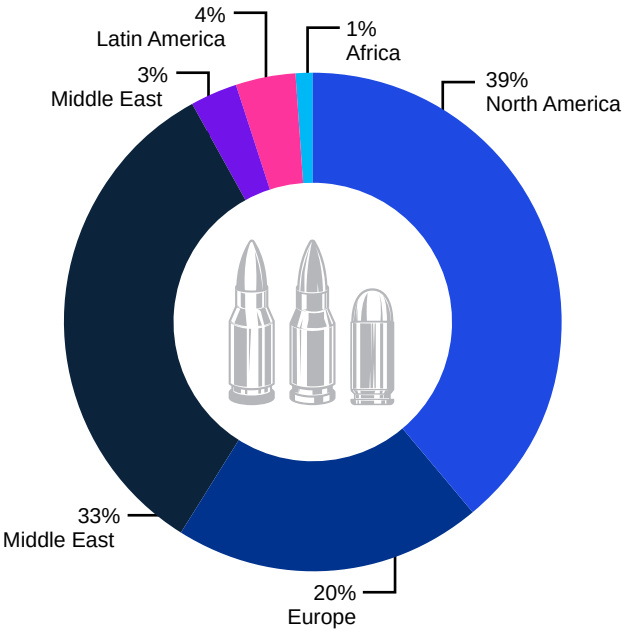
20 mm and 30 mm ammunitions are amongst the most used calibre as they are highly versatile, and they account for about 76 per cent[4] of the total demand. North America, Europe, and Asia collectively account for most of the medium calibre demand, about 92 per cent[4] of the total. USA is one the largest producers and consumers of these calibre ammunition owing to its large fleet of land, arial and naval platforms. North America, Europe, and Asia collectively account for most of the medium calibre demand, about 94 per cent[4] of the total demand worldwide.

Figure 4. Global medium calibre ammunition demand, by calibre, 2023 and medium calibre ammunition demand, by region, 2023

Global medium calibre ammunition demand, by calibre, 2023



Medium calibre ammunition demand, by region, 2023



Source: IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

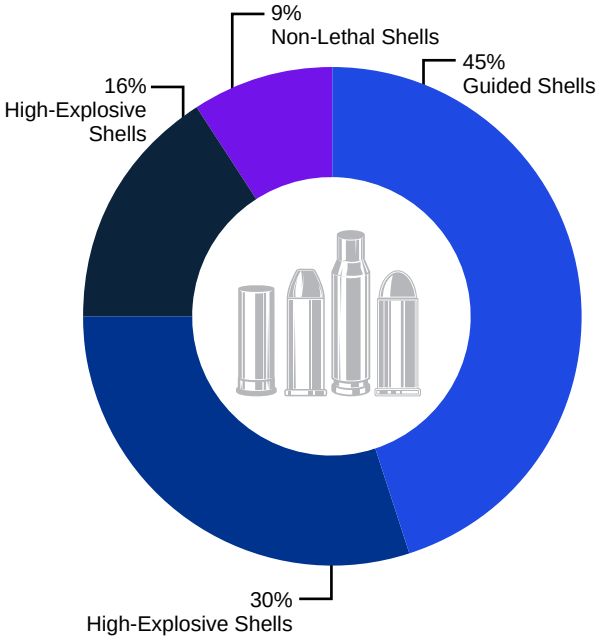
4. IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

Heavy calibre

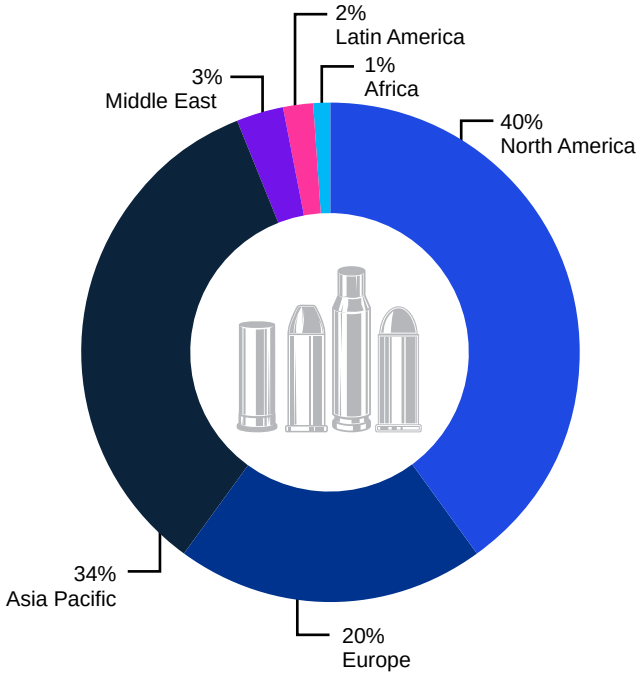
The 155 mm NATO, 105 mm NATO, 120 mm NATO and the 152 mm Russian, 125 mm Russian shells are amongst the most widely used shells in the world whereas the 120 mm and the 125 mm shells are the standard tank ammunition for the NATO and the Russian standard Main Battle Tanks (MBT). Market for guided shells is small in terms of volumes but forms over 45 per cent[5] of the market by value owing to high per unit prices over unguided shells. South Korea, Russia and the NATO countries led by the United States of America are amongst the largest producers of the heavy calibre artillery shells and platforms.

Figure 5. Global heavy calibre ammunition demand, by calibre, 2023 and heavy calibre ammunition demand, by region, 2023

Global heavy calibre ammunition demand, by calibre, 2023



Heavy calibre ammunition demand, by region, 2023



100 per cent = INR69,120 crore
Source: IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

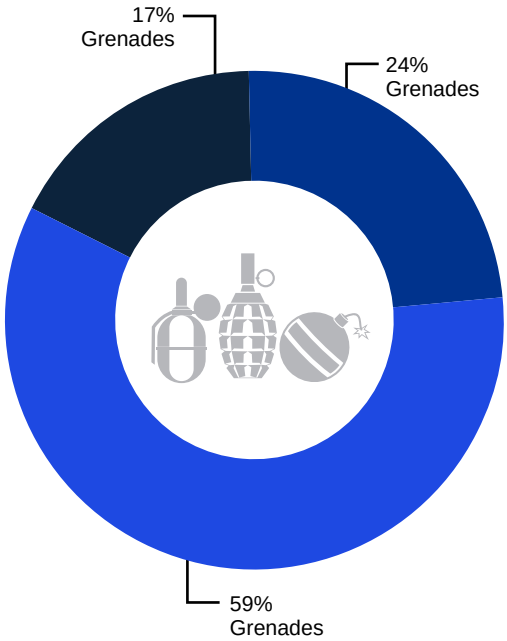
5. IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

Grenades, mortars, and mines

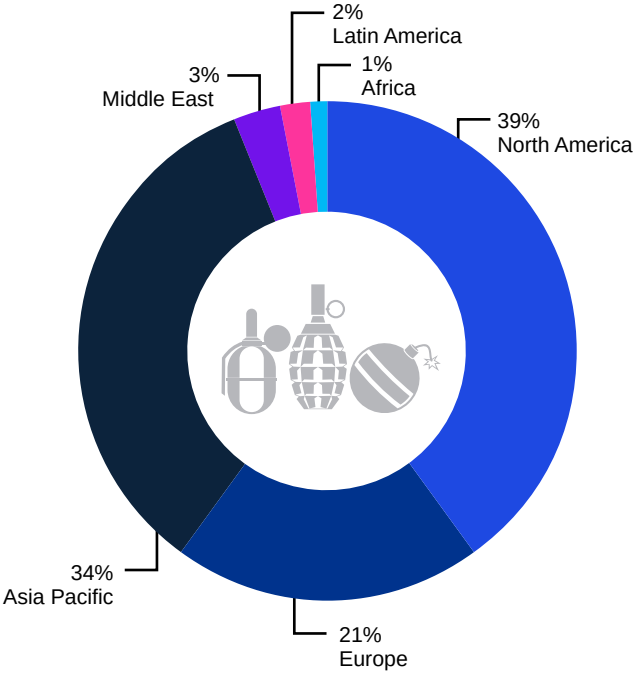
51 mm and 81 mm mortar rounds, multi-mode grenades and fragmentation grenades, land and naval mines are the most widely used. Of the total demand, it is estimated that mortars occupy 59 per cent[6] of the market followed by grenades at 24 per cent[6] and mines at 17 per cent[6]. In terms of regions, North America, and Asia Pacific account for close to 75 per cent[6] of the total demand, primarily driven by recent European conflicts. Naval mines are lower in volumes but higher in per unit prices on account of their size and complexity whereas land mines are regulated by global treaties which limit their usage and deployment, therefore demand. For training purposes, mortar shells are extensively consumed; however, for grenade trainings, special reusable grenades are used.

Figure 6. Global grenades, mortars, mines demand, by type, 2023 and global grenades, mortars, mines demand, by region, 2023

Global grenades, mortars, mines demand, by type, 2023



Global grenades, mortars, mines demand, by region, 2023



100 per cent = INR30,080 crore

Source: IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

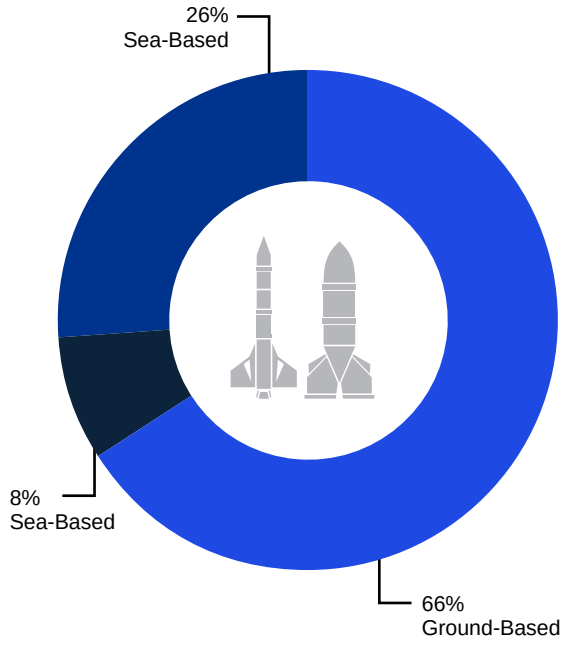
6. IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs). a

Loitering ammunition

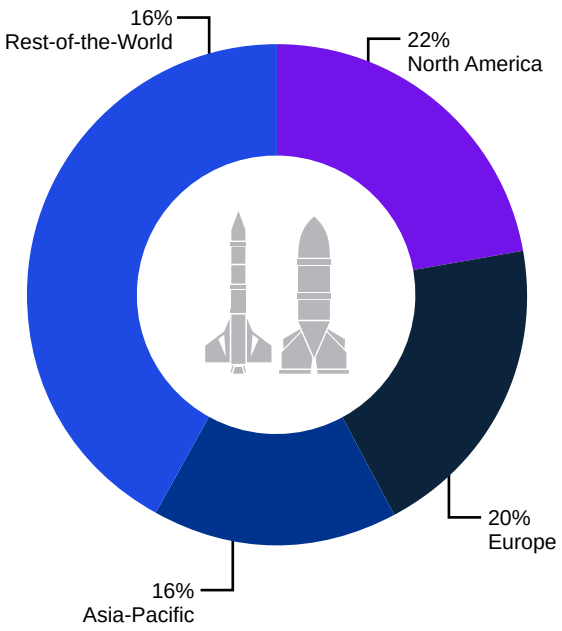
Majority of these platforms are deployed from ground-based launchers, with aircraft launched and ship launched systems being relatively lesser in use.

Figure 7. Loitering ammunition by launch platform, 2023 and loitering ammunition market by region, 2023

Loitering ammunition by launch platform, 2023



Loitering ammunition market by region, 2023



100 per cent = INR4,500 crore

Source: IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

North America, Europe, and Asia collectively account for about 58 per cent[7] of the total demand globally. Middle east, Central Asia and Africa will make up most of the rest of the world's demand.

7. IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

Technological advancements

Technological innovations in the ammunition industry are transforming the landscape of modern warfare. Innovations such as smart munition, advanced materials and alike are improving the efficiency and effectiveness of ammunition. Around the globe, countries are investing heavily in R&D to develop cutting-edge technologies that provide a strategic edge. These advancements improve the performance of traditional ammunition and pave the way for new capabilities such as environment-friendly options. The following table outlines some of the key technological advancements in the ammunition industry.

Table 1. Innovations in the global ammunition industry

Category	Description
Smart ammunition	• Development of smart bullets that can manoeuvre in flight to hit targets that may not be precisely aimed at – compensating for factors like weather, wind, etc. (e.g. EXACTO). • Integration of AI and sensor technologies in munition for real-time data analysis and precision targeting.
Advanced materials	• Use of polymer casings and composite materials to reduce weight and improve durability of ammunition. • Development of lightweight armour-piercing rounds using advanced materials like depleted uranium.
Environment-ally friendly ammunition	• Production of lead-free bullets and biodegradable casings to minimise environmental impact. • Extensive use of green ammunition in training and operational scenarios to reduce pollution.
Enhanced propellants	• Creation of new propellant formulations providing greater efficiency and higher velocities. • Use of advanced chemical compounds to enhance the performance and stability of propellants.
Self-guided bullets	• Development of self-guided bullets that can adjust their trajectory to hit moving targets. • Integration of microelectronic systems within small arms ammunition for enhanced accuracy.
Artificial Intelligence (AI)	• Integration of AI in loitering ammunitions for autonomous navigation, target identification, and mission planning. • Use of AI for swarm technology, where multiple loitering ammunitions can coordinate and execute complex missions autonomously.
Advanced manufactu-ring industry	• 3D printing to produce complex ammunition components with enhanced performance and reduced weight. • Rapid prototyping and production of custom ammunition components using additive manufacturing technologies.

03

Indian ammunition market

The Indian ammunition industry is on a fast track to grow, driven by a combination of strategic initiatives and pressing security needs. The primary drivers are the rising geopolitical tensions in the subcontinent, the need to replenish national stockpile reserves, a comprehensive modernisation program and the resolve to become a self-reliant country.

India's strategic position in South Asia, coupled with ongoing regional conflicts and border tensions has doubled down on the need for a robust and responsive defence stance. It has also driven the Indian government to significantly boost its defence spending, with a defence budget allocation of INR6,21,540 crore[1] (USD72.1 Bn)[1] in 2024-25, up from INR5,94,000 crore[1] (USD72.1 Bn)[1] in 2023-24. This 4.72 per cent[1] increase in allocation from the previous financial year aims to address the evolving security challenges and ensure that the armed forces are well-equipped to handle any threat.

Secondly, to ensure military readiness and for annual training requirements, India endeavours to maintain a robust stockpile of ammunition and to replenish it to the extent consumed or expired. This approach aims at addressing the shortfall in inventory, ensuring the forces have adequate supplies for sustained operations.

Thirdly, India's ambitious defence modernisation programs are a key driver of growth in the ammunition industry. The modernisation efforts are backed by the financial commitments, including a significant allocation of the defence budget to capital expenditures. In the current defence budget, 27.67 per cent[1] of the total was allocated for capital acquisition[1]. The government's initiatives to promote defence production and export play a pivotal role in this context, aiming to increase domestic production and reduce reliance on imports.

Finally, self-reliance is a significant growth driver, propelling the industry towards greater independence and enhanced capabilities. The Indian government's "Atmanirbhar Bharat" initiative underscores this focus by prioritising domestic production and reducing dependency on imports. In the positive indigenisation list released till date[1], there are approximately 85 items[2] that have been identified by MoD to be indigenised by 2034. The items listed include 120mm Fin Stabilised Armour Piercing Discarding Sabot (FSAPDS) Mark II ammunition, 30 mm ammunition for Infantry Fighting Systems (IFS), 155 mm artillery ammunition, 14.5 MM Armour Piercing Incendiary (API) for Anti Material Rifle (AMR).

Market size

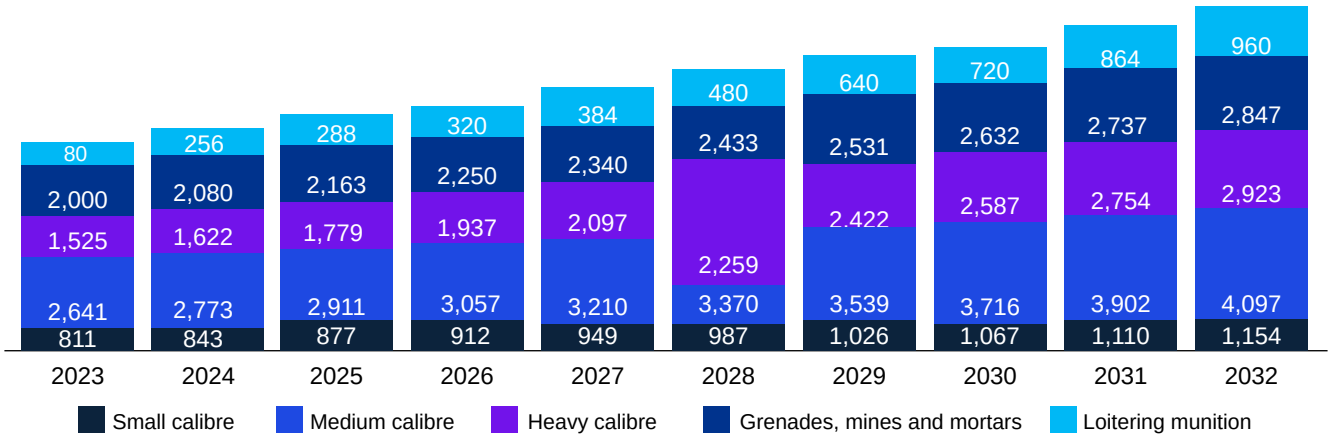
Given that the Indian ammunition market is witnessing substantial growth, we estimate the current market to be worth INR7,057 crore[1] (USD844.0 Mn)[1] in 2023, which is about 5.5 per cent[1] of the global ammunition industry. Majority of this market comprises of medium calibre closely followed by grenade, mines, and mortars.

Over the period 2023-32, we anticipate the market to increase at a CAGR of 4.93 per cent[1] to INR11,981 crore[1] (USD1.4 Bn)[1] – a number that is 6.5 per cent[1] of the global ammunition industry over the same period. This indicates that the Indian ammunition market is going to grow faster in comparison to the global demand.

1. IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).
2. Press Information Bureau, Ministry of Defence, Feb 2024.

Figure 8. Indian ammunition market – current and forecast

Indian ammunition market (INR Cr)



Source: IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

The chart provides a detailed breakdown of the Indian ammunition market's growth components based on the calibre-wise segmentation.

In 2023, the small calibre ammunition market in India was around INR811 crores[3] (USD97.1 Mn)[3] and it is expected to rise to INR1,154 crores[3] (USD138.1 Mn)[3] by 2032, showing a rise of 42 per cent[3]. The Indian Armed Forces, Central Armed Police Forces (CAPF) and state police forces are the major procurers of this ammunition, and it is estimated that they consume about 158 million[3] rounds annually. This number is expected to increase to 225 million[3] units by 2032 with Armed Forces accounting for 85 per cent[3] of the consumption.

The demand for medium calibre ammunition in India was estimated at INR2,641 crores[3] (USD316.1 Mn)[3] in 2023 and is expected to grow to INR4,097 crores[3] (USD490.4 Mn)[3] by 2032, showing a rise of 55 per cent.[3] The demand for medium calibre ammunition is spread across all the wings of the Indian military. In 2023, it was estimated that the Indian military consumed about 5.1 million[3] rounds of various medium calibre annually, and this is expected to grow to 7.8 million[3] units by 2032, driven by modernisation initiatives.

Heavy calibre ammunition is used primarily by land/naval artillery and MBTs. In 2023, the domestic demand for heavy calibre ammunition was estimated to be around INR1,525 crores[3] (USD182.5 Mn)[3] and it is expected to increase to INR2,932 crores[3] (USD350.9 Mn)[3] by 2032, showing a rise of 91 per cent[3]. In 2023, it was estimated that around 1.8 million[3] rounds of heavy calibre ammunition were used, and this number is expected to grow to 2.8 million[3] rounds by 2032.

Over the period of 2023-32, the domestic demand for grenades, mines and mortar is expected to be grow from INR2,000 crores[3] (USD239.4 Mn)[3] in 2023 to INR2,847 crore[3] (USD340.8 Mn)[3] in 2032, showing an increase of 45 per cent[3]. In 2023, the domestic demand for loitering ammunition was estimated at INR80 crores[3] (USD9.6 Mn)[3] and this was expected to rise to INR960 crores[3] (USD114.9 Mn)[3] by 2032. The demand for loitering ammunition, which was estimated at 150 units[3] in 2023, is expected to grow at 1,580 units[3] by 2032.

3. IISS Database (2023), KPMG Research and Analysis, Inputs from Subject Matter Experts (SMEs).

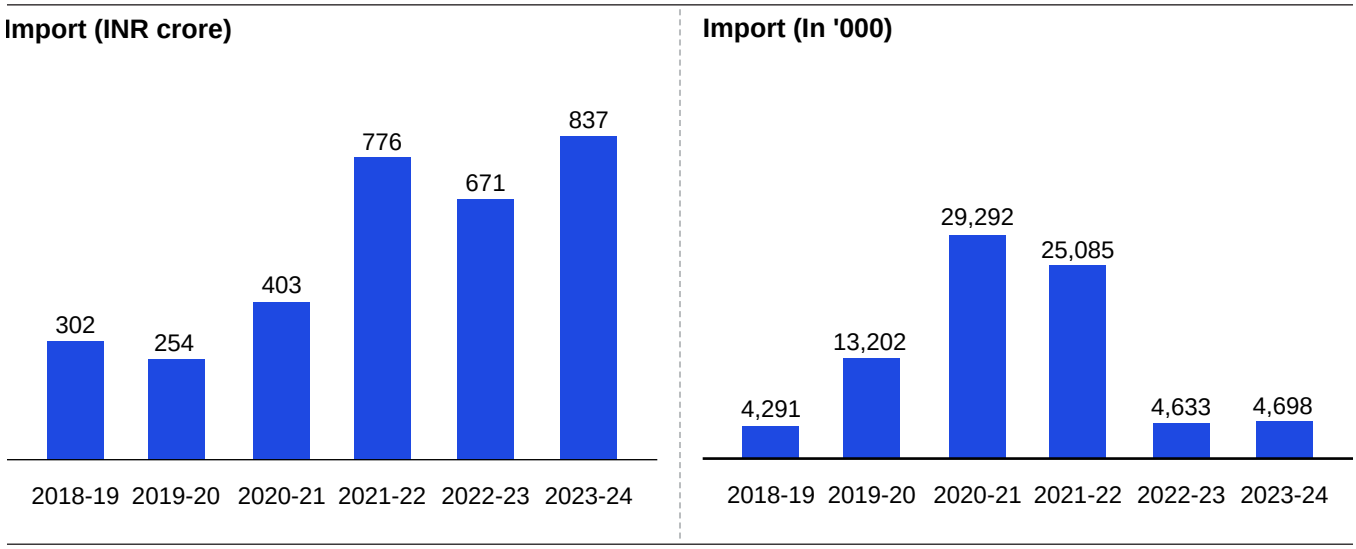
Overview of ammunition imports and exports

India's defence sector characterised by an influx of foreign investments and rapid technological advancements has seen shifts in its imports and exports strategy. Historically, the country has been reliant on importing military equipment including various types of ammunition from countries such as Russia, the United States, France, etc. However, recent years have seen a concerted push towards self-reliance, underlined by the 'Make in India' initiative. With the policy underscoring the importance of reducing dependency on foreign suppliers, and boosting in-house capabilities, the country is emerging as a notable exporter of defence equipment, with key markets in Southeast Asia, Middle East, and Africa.

Import

In 2023-24, India imported ammunition of INR837 crore[4] (USD100.1 Mn)[4] in terms of value and 4.7 million[4] rounds in volume. In terms of small calibre, the DPSUs are capable to meet the domestic demand, but in case of medium and heavy calibre, there is a prominent dependence on European and Russian countries for Import. With respect to advance technology ammunition i.e., the precision guided ammunition, there is almost 100 per cent dependence. However, owing to the indigenisation push, we have seen a decline in the imports in the last couple of years and the Indian defence establishment is striving to become self-reliant as well as a net exporter of ammunition in the next 1-2 years.

Figure 9. Historical values of defence imports and the share of components



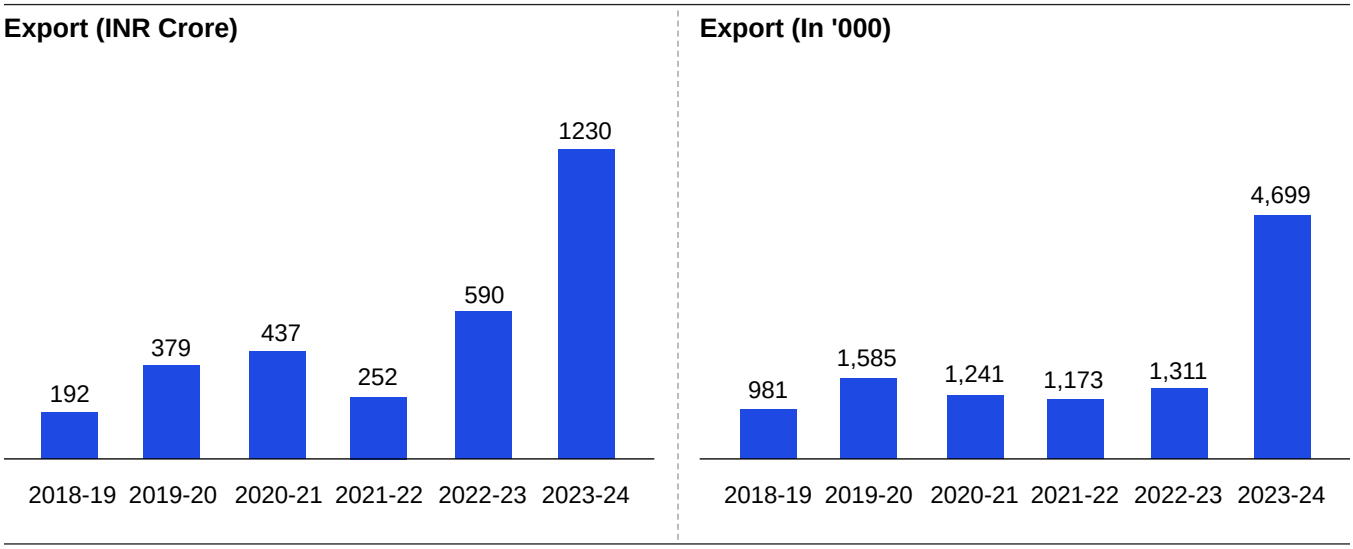
Source: Export and Import trade statistics, Ministry of Commerce and Industry, Department of Commerce, Government of India, July 2024.

4. Export and Import trade statistics, Ministry of Commerce and Industry, Department of Commerce, Government of India, July 2024.

Export

In 2023-24, India exported ammunition of INR1,230 crore[5] (USD147.2 Mn)[5] in terms of value and 4.7 million[5] in volume. Increased focus on indigenisation in the defence sector under the Make in India policy is enabling the increased participation from private players in terms of ammunition manufacturing. The major portion of export involves small calibre ammunition and associated components (machined) of the various calibre.

Figure 10. Historical values of defence exports and the share of components



Source: Export and Import trade statistics, Ministry of Commerce and Industry, Department of Commerce, Government of India, July 2024.

5. Export and Import trade statistics, Ministry of Commerce and Industry, Department of Commerce, Government of India, July 2024.

Indian ammunition industry ecosystem

Having established the substantial growth and current scale of the Indian ammunition market, it is crucial to delve deeper into the technologically complex and regulated landscape that shapes the industry.

Figure 11. Indian ammunition industry ecosystem

Regulatory complications

- Highly regulated industry – stringent licensing requirements and oversight
- High capital investment – manufacturing facilities
- Existing players have competitive adv. because of established government relationships.

Supply chain

- Industry relies on specialized materials and components (e.g. Toluene, Copper) sourced from a limited number of suppliers, increasing the bargaining power
- High concentration of suppliers
- High switching costs because of stringent quality and compliance standards.

Competitive landscape

- Concentrated industry as few large players dominate the market
- Government policies and procurement processes dictate market dynamics.

Limited capability in industry

- Specialized technology required for creating advanced ammunition systems
- Shortage of skilled personnel with expertise in advanced ammunition technologies
- New entrants face difficulties. acquiring cutting-edge technologies because of limited technology transfer agreements.

Monopsony market

- Primary buyers are the government and defence organization, which have significant negotiating power because of bulk order purchases
- Issues with procurement procedures result in fluctuating demand.

Minimal investment in R&D

- Technology advancements globally (e.g., smart ammunition and polymer-based materials) posing a threat to Indian industry focussed on conventional products
- Limited R&D investments by Indian industry will create further disadvantages.

Source: KPMG Research and Analysis

The Indian ammunition industry has traditionally been dominated by government-owned entities namely Defence Public Sector Undertakings (DPSUs). Despite their significant contribution, these organisations have faced legacy issues such as outdated technology, inefficiencies, and supply chain constraints, limiting their ability to meet demands. This has catalysed the need for a more dynamic and responsive production ecosystem.

In response to the increasing demand and supply-demand gap, the sector has seen a surge in investments from both domestic and international players. Liberalisation of defence production policies and initiatives like 'Make in India' have played a crucial role in attracting private sector participation. Until October 2022, the MoD has issued close to 600[6] industrial licences for defence manufacturing to private companies – 1/5th of which have been for the manufacture of guns and cartridges – and cumulative Foreign Direct Investment (FDI) in the defence sector has reached INR5,077 crore[7] (USD607.7 Mn)[7] until 2024. These investments have facilitated the entry of global entities and enabled numerous joint ventures aimed at enhancing domestic production capabilities.

6. Number of licences issued, Arms Licence Online, July 2024.
7. FDI in defence sector, Press Information Bureau, Ministry of Defence, February 2024.

Challenges and opportunities

The Indian ammunition industry, despite its growth, faces several significant challenges that hinder its full potential. Regulatory complexities, technological deficiencies, and a reliance on imports for essential components are among the primary obstacles. These issues not only impede progress towards self-reliance, but also affect the competitiveness of the sector. However, addressing these challenges head-on can pave way for substantial improvements and innovations.

Technological hurdles

India has made good strides in technological advancements, particularly in design innovations which are bringing greater sustainability and improved performance in ammunition production.

Table 2. Defence innovations in design in India (non-exhaustive list)

Product	Type	Features	Advantages
Precision Guided Munition (PGMs) A type of explosive guided by a seeker control system using laser guidance, GPS, and/or integrated inertial navigation for precise military target acquisition	Precision guided kit by an Indian DPSU	A mid-body guidance section that transforms a standard unguided rocket into a precision laser-guided rocket	• Precise target acquisition • Reduced collateral damage and costs • Affordability and compact design • Extended range and effectiveness
	ATAGS (Advanced Towed Artillery Gun System)	Capable of firing precision-guided munition designed to target and destroy armoured vehicles and other high-value targets with high accuracy.	
	Hypervelocity Projectile (HVP) by an Indian DPSU	Capable of executing multiple missions, provides lethality and performance enhancements to land and naval gun systems	
Frangible bullets These bullets disintegrate into tiny particles upon target impact.	• RIP bullets • Multiple Impact Bullet (MIP)	Penetrate less than non-frangible bullets and less risk of ricochet	Non-toxic ammunition

Despite these achievements, the Indian ammunition industry, like many of its defence counterparts, faces technological challenges across different calibre segments.

Table 3. Description of technological hurdles in the Indian ammunition industry

Ammunition-type	Technological challenge
01 Small calibre 	• Achieving high precision and consistency in manufacturing processes is challenging given the size of small calibre ammunition. • Challenging to realise economies of scale. • Small calibre ammunition is more susceptible to temperature changes. • Trade-off between cost savings and technological superiority.
02 Medium calibre 	• Developing multi-purpose projectiles. • Ensuring compatibility with a wide range of platforms. • Controlling heat dissipation and barrel wear.
03 Heavy calibre 	• Lack of technological know-how and the absence of technology transfer. • Ensuring reliability and safety under extreme conditions. • Addressing challenges of long-range accuracy.
04 Grenades, mortars, and mines 	• Stringent safety and disarming mechanisms to prevent accidental detonations. • High cost of raw material procurement to withstand extreme conditions without degrading. • Incorporating advanced miniaturised electronic components for timed and remote detonation.
05 Loitering ammunition 	• Integrating sophisticated sensors and guidance systems. • Ensuring long endurance and reliable loitering capabilities. • Addressing cybersecurity threats and electronic counter measures. • Lack of technological know-how and the absence of technology transfer. • Technology specially for electronics, communication and motion control can change very rapidly leading to technology obsolescence.

To address the broader spectrum of technological challenges, we must consider the specific R&D hurdles that must be overcome. While technological advancements are crucial, the foundation for these innovations lie in robust R&D efforts. Addressing these challenges require overcoming several critical obstacles, including:

- Substantial costs and high gestation period to see the benefits of R&D have not encouraged private industry from investing in R&D initiatives.
- India needs to develop expertise in designing critical components for advanced munitions, including smart and precision munitions.
- Need to push infrastructure and qualified human capital to support R&D initiatives.
- Lack of competition within Indian R&D agencies.

Supply-side constraints

Supply-side constraints in the Indian ammunition sector pose significant challenges, impacting the industry's ability to meet the growing demand for advanced and reliable munition.

Table 4. Description of supply-side constraints in the Indian ammunition industry

Sr. No.	Parameters	Challenges
1	**Input material availability**	• In India, there is no production of Antimony, a raw material used for making small arms and bullets. The entire requirement is met through import of ores and concentrates. • India is not self-sufficient in the production of copper ore – a crucial component in the manufacturing of bullet cartridges. • India is not self-sufficient in the production of iron ore, an important element that can withstand high pressures and temperatures generated during firing. • Limited production of Toluene, a raw material necessary for making TNT. Large-scale production of Toluene requires significant infrastructure and technology that Indian industry does not possess. • There are limited producers of primers and propellant powder in the country
2	**Manufacturing**	Owing to proprietary manufacturing techniques as well as quality concerns, a significant portion of medium calibre ammunition is imported by India
3	**Quality**	Low quality products result in failure rate and delays in orders being placed.

Regulatory barriers

Navigating policy-related obstacles is pertinent for the growth and efficiency of the ammunition industry. A few of the specific regulatory challenges are as mentioned below:

Table 5. List of regulatory barriers in the Indian ammunition industry

Sr. No.	Parameters	Challenges
1	**Procurement**	• L1 based procurement is one of the biggest challenges for private sector companies • Limited tenders/cancellation of ammunition procurement tenders • Procedural delays in terms of conversion of a requirement from Acceptance of Necessity (AoN) to Request for Proposal (RFP) stage to final selection of the vendor.
2	**Licencing and certifications**	• Application process for industrial licence required for ammunition manufacturing has a long turnaround time and is not completely transparent • Quality and safety certification process is a time-consuming process.
3	**Export**	• Procedural delays result in uncertain timelines • Ammunition being a part of the SCOMET list, poses certain restrictions in terms of export items.

Way forward

As the Indian ammunition industry strives to overcome its current challenges, it is essential to chart a strategic path forward:

International collaboration

India's defence sector has witnessed greater international collaborations in recent years. A joint venture between the Indian defence public sector industry and a prominent Russian defence company manufactures ammunition in India. These partnerships exemplify the growing trend of international collaboration, aimed at leveraging foreign expertise and technology to bolster India's defence manufacturing capabilities, which can be replicated in the ammunition industry.

Moreover, such a collaboration is vital for the Transfer-of-Technology (ToT) in the industry, despite supply-side challenges. Though concerns around Intellectual Property (IP) rights exist, international partnerships can address technological and supply-chain issue by providing access to advanced technologies and establishing reliable procurement networks.

Technological capabilities

To address technological challenges, companies must invest in R&D to innovate and keep pace with global advancements. The government should create attractive incentives for foreign players to invest, along with access to local resources, which would make India a more appealing destination for international ammunition manufacturers.

In the Union Budget 2024-25, expenditure on Research and Development increased by INR358 crore[1], an increase of ~3 per cent over 2023-24. The budget is reserved for industry, start-ups, and academia to support collaborative projects involving private companies and academic institutions[1]. For instance, India's premier defence research entity could form partnerships with the private sector to co-develop advanced ammunition-related technologies. These collaborations

1. Budget 2024-25: Speech of Nirmala Sitharaman, Ministry of Finance, Government of India, July 2024.

can accelerate the development of cutting-edge solutions, enhance technological capabilities, and create a robust ammunition ecosystem.

Additionally, the government could reinstate the tax incentives for R&D related expenditure that were phased out in 2021[2]. These incentives previously played a crucial role in attracting investments towards R&D. Their reintroduction could stimulate additional expenditure towards scientific and industrial research in the strategic areas like defence.

2. Economic Survey 2020-21, Page 293 - ES 2020-21_ Volume-1-2, July 2024.

Government interventions

The Government of India (GoI) needs to implement interventions to propel the manufacturing of ammunition. Firstly, a robust redressal mechanism should be established, allowing companies to track and clarify any deficits in applications, ensuring transparency and accountability. Additionally, a streamlined process must be put in place to guarantee that applications for manufacturing licences are processed within stipulated timelines, reducing delays.

Export strategy

India aims to be self-reliant and a net exporter soon for certain ammunition and associated components. With the expansion of production capabilities in the country, the industry focus is on supplying to the African, East European, Latin American, and South-East Asian markets, in the short and medium term. There is opportunity to supply intermediary products, such as propellants, cups, and lead cores, which have the potential to be additional sources of revenue for the industry over and above the final products.

In the long term, with the government support through strengthening strategic relationships, India can expand its defence exports to major markets such as the United States, United Arab Emirates, Saudi Arabia, and European Union countries. Capitalising on low-cost manufacturing capabilities, favourable labour laws and progressive policies, the strategy can also involve promoting joint development, co-production agreements and collaborative R&D projects, for advanced technologies in the domain of ammunition.

Glossary

Abbreviation	Full form
A&D	Aerospace and Defence
ABMS	Advanced Battlefield Management Systems
ACP	Automatic Colt Pistol
AI	Artificial Intelligence
ATAGS	Advanced Towed Artillery Gun System
AUVs	Autonomous Subsurface Vehicles
AVNL	Armoured Vehicles Nigam Ltd
CAGR	Compounded Annual Growth Rate
CAD	Computer Aided Design
DAP	Defence Acquisition Procedure
DDP	Department of Defence Procurement
DGQA	Directorate General of Quality Assurance
DIO	Defence Innovation Organization
DPEPP	Defence Production and Export Promotion Policy
DPM	Defence Procurement Manual
DPP	Defence Procurement Procedure
DPSU	Defence Public Sector Units
EU	European Union
EXACTO	Extreme Accuracy Tasked Ordnance
FDIs	Foreign Direct Investment
FICCI	Federation of Indian Chambers of Commerce and Industry
GoI	Government of India
GPS	Global Positioning System
HAL	Hindustan Aeronautics Limited
HEAT	High Explosive Anti-tank
HEI	High Explosive Incendiary
HET	High Explosive Tracer
HVP	Hypervelocity Projectile
IC	Indigenous Content
IDDM	Indigenously Designed, Developed, and Manufactured

Abbreviation	Full form
iDEX	Innovation for Defence Excellence
IFV	Infantry Fighting Vehicle
IIT	Indian Institute of Technology
IISC	Indian Institute of Science
INR	Indian Rupee
INS	Indian Naval Ship
INSAS	Indian Small Arms System
MBT	Main Battle Tank
MIP	Multiple Impact Bullet
MoD	Ministry of Defence
MoU	Memorandum of Understanding
MSMEs	Micro, Small and Medium Enterprises
NAL	National Aerospace Laboratories
OEM	Original Equipment Manufacturer
PGMs	Precision Guided Munitions
PLI	Production Linked Incentive
PPPs	Public Private Partnerships
R&D	Research and Development
RETID	Regime for the Defence Industry
RIP	Radically Invasive Projectiles
SIPRI	Stockholm International Peace Research Institute
SMARt	Suchzünder Munition für die Artillerie
SMEs	Small and Medium Enterprises
TDF	Technology Development Fund
TNT	Trinitrotoluene
UAVs	Unmanned Air vehicles
UGVs	Unmanned Ground Vehicles
UP	Uttar Pradesh
US	United States
USD	United States Dollar

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