VENTUP
SUSTAINABLE MANUFACTURING

Building India's Manufacturing Momentum

Foreword

A strong manufacturing industry is imperative for India's sustained economic growth and global competitiveness. As we stand at the crossroads of technological advancement and shifting global supply chains, the urgency to strengthen and expand our manufacturing sector has never been greater. With this white paper, we aim to provide a roadmap for the sustainable growth of this crucial sector. To research the paper, we studied the numbers and examined a substantive body of work, as well as spoke to industry experts and founders in the manufacturing trenches to validate our findings. We hope it will serve as an insightful resource to help you cut through the noise as well as be an inspiration to stakeholders committed to shaping a robust future for manufacturing.

Sincerely

Sandeep Nair
Co Founder & CEO

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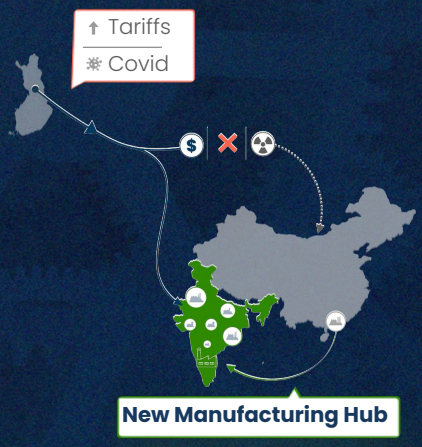
Executive summary

The Indian manufacturing sector experienced significant dynamism in the 2015-2025 period, propelled by policy initiatives, a large domestic market, and availability of a competitive labour force.

The COVID-19 pandemic & the consequent China+1 strategy by global majors to derisk from China was a major trigger to increase manufacturing from India



While the scale of China's sprawling factories symbolises its manufacturing prowess, in India the vibrancy and resilience of the MSME sector represent the growth potential of the manufacturing sector. The advent of cloud manufacturing or Manufacturing-as-a-Service firms, which provide manufacturing solutions leveraging a wide network of MSME partners, represents an important step in the evolution of India's manufacturing ecosystem with the potential to catalyse MSME growth in manufacturing.

- **Infrastructural deficits**
- **Streamline regulations**
- **Enhance skill development**
- **Foster a robust R&D**
- **Develop innovative ecosystem**

Self-reliant manufacturing is key for India to become a major player in the global value chain and achieve **Viksit Bharat by 2047**

Introduction

India's manufacturing sector has been a significant contributor to the country's overall economic output. It has also been a substantial generator of jobs with its growth fuelled by the expansion of medium, small and micro enterprises (MSMEs), **which account for 45% of the country's exports.**

The Union Budget 2025-26 recognized the importance of manufacturing and of MSMEs as an engine of India's economic progress and future growth with the setting up of the National Manufacturing Mission and targeted measures aimed at strengthening MSMEs.

In recent months, India's manufacturing capabilities have come into sharper focus following the announcement of 'reciprocal tariffs' by the United States. With tariffs on goods imported from China attracting the steepest hikes, international orders to India recorded their second fastest upturn in more than a decade in the month of April, according to the HSBC India Manufacturing PMI. Apple also announced all its US iPhone assembly would happen from India by 2026, in a validation of how India is emerging as a logical alternative to China, especially in some areas.

India's tryst with manufacturing

Dotted across India's financial capital of Mumbai, sprawling textile mills, now mostly converted to commercial spaces, bear witness to India's past manufacturing ambitions. Manufacturing was a key focus for the country's first elected government, which prioritised the setting up of factories in telecommunications, aeronautics, and machinery. This laid the foundation for the country's manufacturing industry and private enterprise, providing employment to a nation that was primarily agrarian. However, many of these manufacturing units fell into decline and became defunct with a few exceptions like HAL & BHEL after India opened its economy in 1990s.

In 2014, India's manufacturing revival was led by the ambitious vision laid out by the Make in India initiative to be a global hub for innovation, design and manufacturing for 27 sectors. Under this, several schemes such as Production Linked Incentive (PLI) were rolled out to create an enabling environment for domestic manufacturing. The initiative, now over a decade old and in its second phase, marked the start of India's modern manufacturing growth.

The initiative's focus on improving infrastructure, building skills, simplifying regulation, and attracting investment has helped to create a conducive environment for domestic manufacturing, reducing dependence on imports and providing employment for skilled and semi-skilled labour.

Schemes such as the Production Linked Incentive (PLI) and Atmanirbhar Bharat have played a significant role in encouraging global players to set up factories in India and assemble and source components locally. Today, the country counts itself as the world's second largest mobile manufacturer with manufacturing value of mobile phones rising to Rs 4,220 billion and exports crossing Rs 1,290 billion. Nearly all mobile phones sold in the country are now made domestically. The country has also rolled out a scheme targeted at becoming self-reliant in the electronics supply chain and attracting investments in components manufacturing.

Unnikrishnan Kottekkat
Joint Director General, FIEO

The turning point in India's manufacturing is the

Make in India Initiative	**PLI Scheme**	**Introduction of GST**

Helped India attract manufacturing in several sunrise sectors

Emerging hub for aircraft components

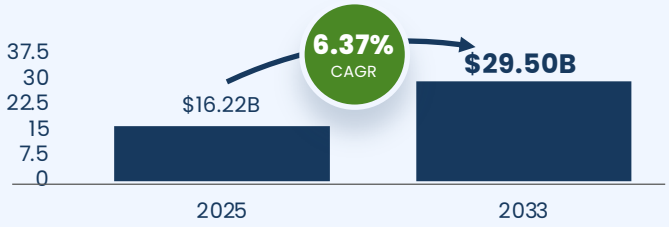
The country is also fast emerging as a hub for manufacturing aircraft components. Strong demand from India's civil aviation sector and defence aviation is propelling global manufacturers to set up facilities here and source locally. Indigo, the country's largest commercial airline, is said to have placed the largest order in aviation history from Airbus,

According to news reports

The airline will add one aircraft to its fleet every week

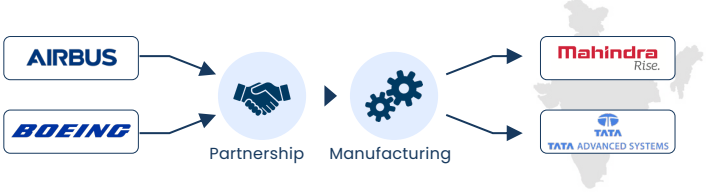
Pieter Elbers
CEO, Indigo

Global management consultancy firm IMARC Group pegs **India's aircraft component market to be at**



It also notes the market is witnessing a significant shift toward localization, driven by government initiatives like Make in India and Atmanirbhar Bharat, and SMEs specializing in precision engineering and composite materials further strengthening India's position as a global aerospace manufacturing hub.

Both Airbus and Boeing have announced significant partnerhips to manufacture in India with the Mahindra group and Tata Advanced Systems Ltd (TASL).



TASL is also expected to set up a dedicated manufacturing facility in Hyderabad for France's Dassault Aviation's Rafale fighter jet fuselages to cater to local and export markets.

The country is presenting a strong pitch to become a global hub for MRO (Maintenance, Repair and Overhaul) with the prime minister Narendra Modi outlining India's ambitions to become a $4billion MRO hub *by 2030*

French engine manufacturer, Safran Engineering, is setting up its largest MRO at Hyderabad in India. Cloud manufacturing firm, Macreq Manufacturing, which is vertical focused player in defence and aviation, sees the manufacturing of MRO tools as a start to moving into manufacture of aircraft engine parts and eventually, making entire engines in India.

A confluence of factors

India's pro-manufacturing policies created conducive environment for manufacturing facilities to be set up in the country. The Make in India and the PLI schemes to incentivise domestic manufacturing made India attractive to global manufacturers when they started scouting for alternatives to China after 2020. The pandemic was the turning point, forcing global firms to incorporate strategies to derisk their supply chain from their reliance on China.

COVID-19 revealed vulnerabilities in single-source supply chains, accelerating diversification to countries like India.

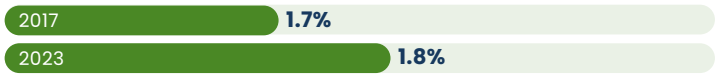
Ramakrishnan Gopalakrishna
Energy Consultant, Ex L&T, Tata, Wartsila

The stringent lockdowns imposed by China as part of its Zero Covid policy caused a shortage of parts that affected manufacturing production globally. Manufacturing output registered a sharp decline of 6% in first quarter of 2020, according to the UNIDO. The China+1 strategy caused a global realignment of the value chain with manufacturing locating mostly to Asian countries and Mexico.

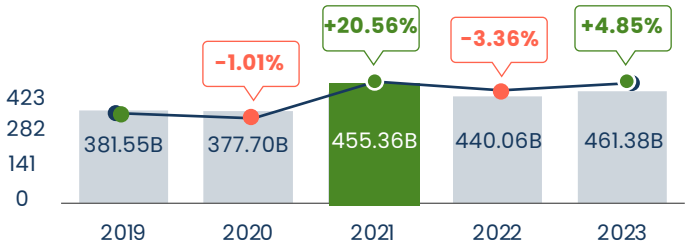
India's large and growing domestic market was also an important consideration prompting global manufacturers to look at making in India in areas like consumer goods and electronics. This expanding consumer base provides a strong incentive for both domestic and foreign companies to invest in manufacturing within India to cater to this growing demand. The increasing purchasing power, especially in rural areas, has further broadened the market for manufactured products, creating opportunities for sustained growth in the sector.

Successful, but not quite

Yet, despite these successes and in other areas like bulk drugs and auto-components, India has missed the targets it has set to increase the manufacturing sector's contribution to GDP. The sector's contribution has languished between 12% and 17%, even dipping in some years. The country's share in global manufacturing exports has also grown at slower pace than Asian peers like Vietnam, creeping



India manufacturing output



Given India's size and economic heft, the country is therefore, clearly punching below its potential. So, while a promising start has been made, challenges remain. Infrastructure bottlenecks are being addressed but higher logistics costs, longer port wait times and unpredictability even in transit within the country remain deterrents.

Spends on R&D at **0.7%** of GDP, lag behind countries like

4.8% South Korea | **2.4%** China

Many manufacturers rely on obsolete machinery, reducing efficiency and competitiveness. Slow adoption of automation and digital technologies also hampers productivity gains.

India has long aspired to become a global manufacturing powerhouse. While it has achieved significant progress in several industries, the sector has often lagged its full potential due to structural challenges like infrastructure bottlenecks, complex regulations, and dependence on imports for critical components

Unnikrishnan Kottekkat
Joint Director General, FIEO

Right place, Right time

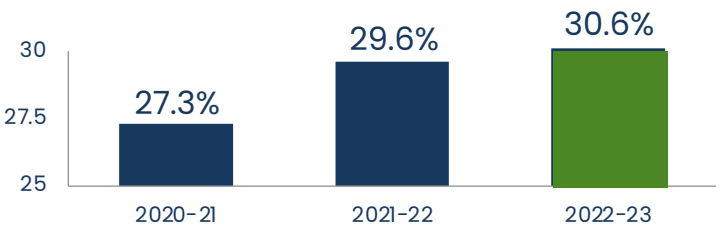
India is in the right place at the right time to build itself into a position of strength in manufacturing. Intelligent manufacturing, IoT, robotics and advances in AI and quantum computing are transforming manufacturing into a knowledge-enabled industry, where innovation will be a key differentiator. India, with its sizable talent in emerging technologies, is well-positioned to capitalise on this manufacturing transformation will be the lowest in its history at 31.2%. This offers a significant advantage in terms of availability of manpower, cost-competitiveness for manufacturing and India's growth and purchasing power

With 65% of India's population below 35 years, the country has a vast labour pool. By 2030, data compiled by EY, shows India will have 1.04 billion working age persons, and its dependency ratio

Can small be beautiful?

Unlike China's manufacturing might that is built on sprawling factories with housing for workers, MSMEs are a key driver of India's manufacturing momentum, contributing over 45% to exports and employing over 0.25 billion people. Their contribution is not limited to industries such as toys, leather and food processing but extends even to hi-tech and specialised industries like aerospace as mentioned in the previous section.

Share of MSME gross value added (GVA) on India's GDP



As a group, MSMEs have shown resilience and increasing integration to global trade as demonstrated by their contribution to exports. Yet, their fragmented nature, makes it more challenging to manage consistent quality and outcomes.

Employing a minimal workforce each, these machine shops form an integral part of the India's manufacturing engine. By scaling them and setting them up for success, Indian manufacturing can also succeed. Recognising this, in the Union Budget 2025-26, India increased the investment and turnover limits for MSMEs and announced steps to enhance credit availability to strengthen this segment.

MSMEs struggle with project management, balancing the running of operations with finding customers and managing their manpower, leaving little time for other strategic issues. At times, capacity remains under-utilised in the absence of a steady order pipeline. On the other hand, many global buyers lack the expertise and experience to source from MSMEs.

To export at scale globally, our supplier ecosystem must evolve—MSMEs are key, not just big conglomerates

Jagadeesh Govindaraj
Co-Founder & CEO, Macreq

Catalysing growth with MaaS

The rise of startups that offer manufacturing-as-a-service (MaaS) fulfils a need that was the limiting growth of the sector. MaaS providers offer manufacturing solutions such as sourcing, design, prototyping, quality assurance and project management support to ensure timely deliveries and adherence to quality standards.

This can enhance the operational efficiency of MSMEs and enable them to undertake larger and more complex manufacturing projects, boosting their competitiveness and growth potential. Typically founded by experienced manufacturing professionals, MaaS providers act as a conduit between MSMEs and global manufacturers, matching the requirements for the job with MSMEs that are the right fit for it. With design engineering and project management skills they bring that additional layer of rigour and experience needed for global value chains.

For buyers, this avoids the complexity of coordinating with multiple vendors to source components with MaaS providers taking ownership of end-to-end development. For MSMEs, this takes away the need to focus on sales, requirement gathering and project management, freeing up bandwidth to focus on their core competence and technical know-how. For buyers, this removes uncertainty and unknowns they must manage while sourcing from multiple MSMEs.

Many MaaS providers were founded in the early part of the decade, when there was a need in the industry around the time there was a realisation around the importance and urgency of having China+1 strategy. When it comes to India, there is no one size fits all. However, a negative experience with one supplier can influence future decisions to source from the country and in this context, MaaS firms play a vital role in positioning the country as credible alternative to China in manufacturing

The phenomenal success of Zetwerk, one of the earliest players in the MaaS space, shows this is an idea whose time has come with the realignment of global supply chains and India's intentional efforts towards becoming a global manufacturing hub.

"It is the MSMEs within India where the biggest growth will take place as they grow to be export oriented. At that point, the potential of the manufacturing sector in India is limitless"

Tim Johnson
Manufacturing Specialist, USA

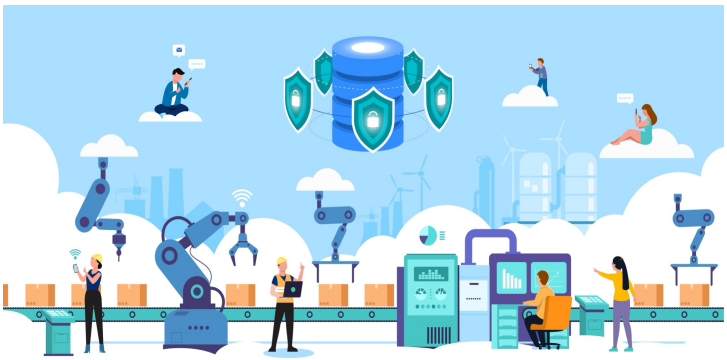
Recommendations

Long term, the view on India's rise as a global manufacturing hub & alternative to China remain optimistic. Converting that potential to reality will require India to stay invested on the path it has charted as well as reimagine future with bold vision & patient capital.

Supplier ecosystem & strategic manufacturing corridors:

A well-developed supply chain ecosystem and concentrated industrial clusters have been pivotal to China's dominance in global manufacturing. In China, co-located suppliers, component vendors, and tooling services work in close proximity, creating efficiencies, reducing lead times, and enabling economies of scale. India, by contrast, often lacks this level of integration, particularly in high-value sectors like electronics and semiconductors.

To address this, India must focus on building sector-specific industrial clusters that support end-to-end manufacturing—such as for electric vehicles, semiconductors, and precision engineering. These clusters should encourage the co-location of suppliers, logistics providers, and manufacturers. Additionally, launching robust supplier development programs to upgrade the capabilities of MSMEs will be essential in establishing reliable upstream and downstream linkages within these clusters.



Advanced manufacturing skilled workforce development:

A skilled workforce is fundamental to driving advanced manufacturing. China has made significant investments in vocational education tailored to the needs of its industrial ecosystem, ensuring a steady supply of workers trained in areas like precision machining, electronics, and automation. In contrast, India continues to face a significant skills gap, particularly in high-tech manufacturing sectors. To bridge this divide, India must revamp its Industrial Training Institutes (ITIs), modernizing curricula to align with current and future industry demands.

Collaborations with industry players through structured apprenticeship programs can provide practical, hands-on training. Furthermore, public-private partnerships (PPP) should be encouraged to establish Centers of Excellence focused on critical skill areas such as robotics, CNC operations, and smart manufacturing technologies, thereby creating a future-ready workforce.

Several Tier 2 cities in India are emerging as promising models for workforce development in advanced manufacturing, particularly through student-driven initiatives. For example, in Kerala, a strong emphasis on technical education, coupled with proactive state support, has fostered a culture where students are encouraged to pursue entrepreneurship and innovation from their college days.

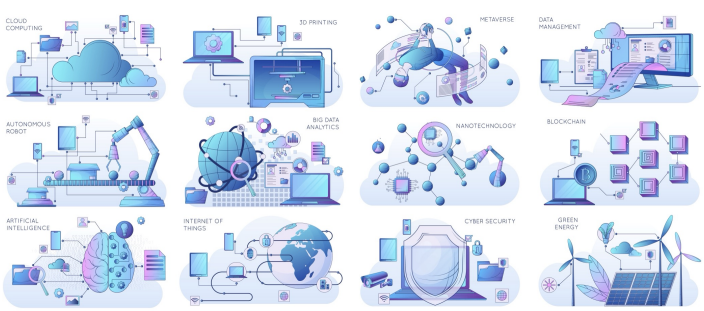
Institutions like government engineering colleges and incubation centers such as the Kerala Startup Mission (KSUM) actively support manufacturing-focused startups launched by students, enabling them to convert academic projects into scalable ventures. This hands-on exposure not only builds practical skills in design, prototyping, and production but also bridges the gap between academia and industry.

Tier 2 cities like Coimbatore, Hubli, and Visakhapatnam follow similar models, where local ecosystems promote early-stage manufacturing ventures, often rooted in regional industrial strengths. These initiatives are redefining workforce development by embedding entrepreneurial thinking and technical competencies at the grassroots level, equipping the next generation to lead India's transition to an advanced manufacturing economy.

Technology & innovation adoption (Automation, R&D, Industry 4.0)

China has surged ahead in adopting cutting-edge manufacturing technologies, including automation, robotics, and industrial artificial intelligence, positioning itself as a global leader in smart manufacturing. In contrast, a significant portion of Indian manufacturing, especially within the MSME sector, still operates with outdated machinery and minimal digital integration.

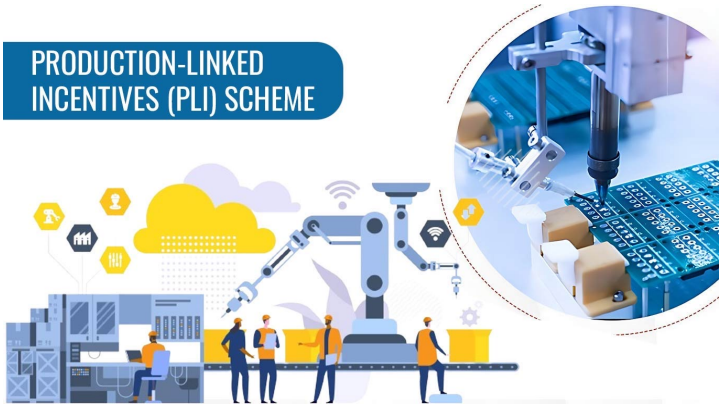
To remain globally competitive, India must accelerate the adoption of Industry 4.0 technologies across its industrial landscape. This can be achieved by offering targeted subsidies and tax incentives to encourage MSMEs to invest in automation, data analytics, and digital tools. Additionally, India needs to strengthen its R&D ecosystem through robust public-private tailored to India's unique manufacturing needs. partnerships, increased funding, and incentives for indigenous product innovation. Promoting collaborative research between academia, startups, and established industries can also drive the development and commercialization of new technologies



Government initiatives and policy reforms:

Government Initiatives and Policy Reforms are vital enablers for manufacturing growth, where India still trails China in scale, execution speed, and strategic alignment. China's rapid industrial ascent has been driven by unified government planning, landmark policies like Made in China 2025, and efficient institutional support.

The Government of India has rolled out several sector-specific PLI schemes across critical areas such as semiconductors, electronics, EVs, pharmaceuticals, and green energy equipment, committing funds to incentivize large-scale manufacturing. The India Semiconductor Mission (ISM), for instance, aims to build a resilient chip ecosystem domestically, while the EMC 2.0 scheme supports the development of electronics manufacturing clusters.



The Department for Promotion of Industry and Internal Trade (DPIIT), through its Startup India initiative, has been instrumental in nurturing the Indian manufacturing startup ecosystem. By offering benefits such as tax exemptions, faster patent filing, self-certification for labor and environmental laws, and access to the Fund of Funds for Startups (FFS), the initiative encourages innovation and ease of doing business. Special focus is given to manufacturing-led startups under schemes like the Startup India Seed Fund and Startup India Action Plan, fostering the growth of deep-tech, hardware, and industrial ventures. DPIIT's support has helped position India as a hub for new-age manufacturing startups, driving localization, sustainability, and global competitiveness.

In logistics and infrastructure, the Gati Shakti Scheme offers an integrated, multimodal approach to reduce transit times and operational inefficiencies by aligning logistics corridors, rail, road, port, and air connectivity. Additionally, the State Reform Action Plan under Ease of Doing Business rankings is nudging states to adopt pro-business regulations and improve local implementation.

In contrast, while India has launched promising efforts such as Make in India, PLI schemes, and the National Logistics Policy, ground-level impact remains limited due to fragmented state policies, and slow incentive rollout

To make real progress, India must offer transparent, time-bound incentives for key sectors and enable states to build focused manufacturing clusters—such as defense corridors, EV parks, and medical device parks—under a cohesive national framework. Creating Special Manufacturing Zones with plug-and-play infrastructure, skill development programs aligned with industry needs and harmonized policy frameworks across central and state levels will be key to enhancing execution on the ground.

By strengthening coordination, reducing procedural friction, and enabling ecosystem-level growth, India can emerge as a credible alternative to China and realize its ambition of becoming a global manufacturing powerhouse.

Conclusion

Unlike the IT services boom driven by global outsourcing in the 2000s, India's manufacturing rise is being fuelled by strategic global shifts—like China+1 policies, geopolitical realignments, and domestic incentives such as the PLI scheme. This growth is export-oriented (e.g., iPhones, cars, electronics) but also aims to build resilient local supply chains. However, unlike China's state-led, infrastructure-heavy approach with massive state-owned enterprises, India's path is more decentralized and private-sector-driven. A manufacturing boom is within reach —but India's model will be more flexible, innovation-led, and startup-friendly than China's scale-driven model.

This decentralized, innovation-led approach uniquely positions India to redefine global manufacturing by building on its strengths—an abundant pool of engineering talent, a rapidly growing startup ecosystem, and strong government backing through initiatives like PLI, Make in India, and infrastructure upgrades. Unlike legacy manufacturing hubs that are now grappling with rising costs and overdependence on centralized supply chains, India offers a resilient, agile, and digitally integrated alternative. The surge in MSMEs, along with the increasing participation of large private players in high-tech sectors like EVs, aerospace, electronics, and green energy, is accelerating self-reliance and export competitiveness. With policy momentum and global trust aligning in its favor, India is not just catching up—it is poised to lead the next era of sustainable, innovation-driven manufacturing.

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Energizing India's Manufacturing Ecosystem

VENTTUP
SUSTAINABLE MANUFACTURING

Venttup Ventures Private Limited

Bangalore: No 12 - 16, 3rd Floor, DVR Town Center, Budigere Road, Mandur Village, Bidarahalli Hobli, Bangalore East Taluk, Bangalore, Karnataka 560049, India

Kochi: No. 60/44, 3rd Floor, JC Chambers, Panampilly Nagar, Ernakulam- 682036

Website: www.venttup.com I **Email:** sales@venttup.com

+91 9717002538
+91 9946174719