Revving Up Exports

The Next Phase of Export Growth for the Auto Component Industry

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BCG + ACMA

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The Automotive Component Manufacturers Association of India (ACMA), with over 1,000 members, is the premier organization representing India's automotive components manufacturing industry. ACMA's mission is to drive industry growth, job creation, and economic prosperity. Committed to research and development, ACMA ensures that India remains a leader in global automotive components manufacturing.

ACMA plays a critical role in advancing India's automotive industry by promoting trade, enhancing technology, improving quality, and disseminating information. The association participates in international trade fairs, sends trade delegations abroad, and publishes industry reports. ACMA supports its members through an expanding network, offering valuable resources, industry insights, and collaboration opportunities. The organization is also instrumental in shaping policies and regulations that foster sustainable and inclusive growth.

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EXECUTIVE SUMMARY

India's auto component industry is a critical pillar of the Indian automotive sector, supporting domestic and international supply chains. The industry accounted for $75 Bn in output, growing at ~8% CAGR since FY14 and contributing significantly to India's manufacturing growth.

Global OEMs and Tier-1s are increasingly sourcing from India, underscoring the sector's growing global competitiveness. Exports from India have surged to $21.2 Bn in FY24, reaching 1.4x from $15.2 Bn in FY19. The industry turned to a net trade surplus in FY24, with auto specific end-use cases accounting for more than $1 Bn trade surplus. Beyond scale, the industry has also made strides in the nature of exports, evolving from basic components to advanced, tech-driven critical components.

INDIA'S GLOBAL TRADE POSITIONING

The global auto component trade today is at $1.2 Tn, growing at ~2% CAGR over FY19-24. North America and Europe are the largest importers, with imports of $170 Bn and $151 Bn respectively from the rest of the world.

On the exports side, China dominates the market with $149 Bn exports, in contrast to India at $21 Bn. This presents a significant headroom for India to expand its footprint and strengthen its position in key export markets.

EMERGING INDUSTRY TRENDS

Four key trends are shaping the future of the auto component industry, creating new opportunities for Indian exports:

- **Electronification:** 40-45% of the car's bill of materials in 2030 is expected to comprise of electronic components, driven by increasing adoption of components such as ADAS, infotainment and connectivity solutions
- **Electrification:** Electrification momentum is building globally. BEV penetration in new light vehicle sales is projected to be 5x by 2035. Similarly, PHEVs and HEVs are expected to see a 150% rise by 2030. Despite this, ICE powertrains are forecasted to maintain the largest light vehicle market share until 2030, after which BEVs will surpass them
- **Lightweighting:** OEMs globally are shifting towards lightweight materials to improve fuel efficiency and reduce emissions, with the average new vehicle kerb weight expected to fall to 70% vs 2019 levels; creating a surge in demand for advanced composites and light-weight materials
- **Global trade dynamics shift:** Global trade dynamics in recent years are reshaping the global supply chain and manufacturing footprint of OEMs

ROADMAP TO $100 BN EXPORTS

Indian industry has taken an ambitious target of reaching $100 Bn in auto component exports. For achieving this ambition, India needs to position itself as a hub for both classic and emerging auto components. More specifically:

Doubling down on Classic Vehicle Component Exports:

India currently exports $21 Bn, and has the potential to add another $40-60 Bn by focusing on:
- Doubling down on a select group of 11 product families
- The US and Europe for export of these components

Currently, India is cost competitive across most categories. For components such as fasteners, wheels/ rims and gears, India's landed costs in the US are 25-30% lower than China.

While India has a cost advantage, there are several areas for development based on inputs from CPOs at leading global Auto OEMs and Tier-1s:

- **Technology:** Ramp-up R&D investments to accelerate innovation and next-gen tech adoption
- **Engineering:** Enhance engineering capabilities by improving tooling, prototyping, and reducing lead times for new product development
- **Target Geo Presence:** Improve global supply chain integration with stronger warehousing and on-site engineering presence in key markets
- **Quality:** India needs to enhance quality standards through better process controls, automation, and adoption of global best practices

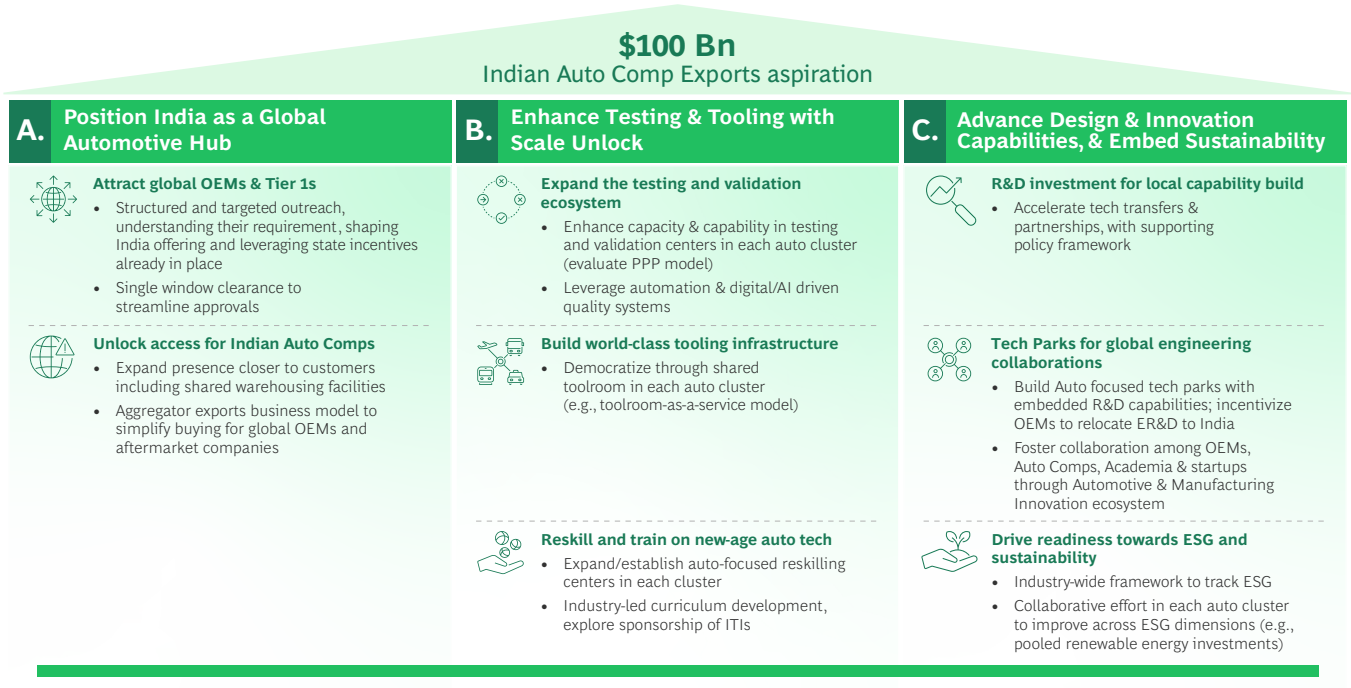
Capitalizing on Electric and Electronic Component Exports:

Localization of the electronics value chain is a priority agenda today, which lays a strong foundation for its emerging role in automotive applications. Components such as battery management systems, telematics units, instrument clusters, ABS, etc., can present a potential opportunity for India to export and tap into additional $15-20 Bn exports.

Achieving this would require India to increase the localization of electriconics and EV components by expanding its domestic manufacturing capacity and fostering technology partnerships with global OEMs and Tier-1s to accelerate its expertise in these complex products.

STRATEGIC ENABLERS FOR SCALING INDIA'S AUTO COMPONENT EXPORTS

We propose three strategic interventions to set Indian Auto Comp on an accelerated path towards $100 Bn export aspiration:



A. Position India as a Global Automotive Hub:

Establish India as a preferred manufacturing and sourcing hub for global OEMs and Tier-1s, ensuring strong export growth

Global auto Tier-1 suppliers have been instrumental in driving exports and localization. However, currently less than half of the top 50 global Tier-1s have a local manufacturing presence in India.

With global supply chains being reshaped by emerging trade regulations, global OEMs and Tier-1s are increasingly re-evaluating India's position in their global footprint.

In this context, positioning India as a Global Auto Hub requires action across three levels:

A.1. Attracting Global OEM and Tier-1 to set up design, sourcing and manufacturing base in India:

- Proactive outreach to global OEMs and Tier-1s and crafting tailored support (e.g., co-ordinated central and state level incentive package for OEMs and their cluster of Tier-1s and Tier-2s, driving ease of setting up / migrating capacity, dedicated government facilitation channel)
- Single-window clearance to streamline approvals and fast-track investments

A.2. Unlocking Global Access for Indian Auto Comp:

- Shared warehousing facilities closer to large global automotive clusters can support Auto Comp players to address shipping reliability. Particularly, shared warehousing in smaller global markets (e.g., Southern Europe, Latin America), with limited current presence by Indian Auto comps can help accelerate exports. This will require an initial facilitation from ACMA and Indian Government Agencies from target geographies, in collaboration with logistics players
- Industry-led Global Demand Aggregator based model for export facilitation can drive greater collaboration with OEM R&D teams and Indian Auto Comp players through an engineering presence in global clusters. This could be an interesting new business proposition for incumbent players in the sector, or may be initiated through initial orchestration by industry bodies (e.g ACMA) together with International Procurement Offices (IPOs) of Tier-1s and OEMs

B. Enhance Testing and Tooling capabilities:

Build world-class validation, engineering capability, and tooling infrastructure – enabling India for the World

While 80% of procurement leaders across global OEMs and Tier-1s are open to sourcing from India, there is resonating feedback for improving capacity and speed of Indian testing and toolroom capabilities to global benchmarks.

In particular, the industry can benefit from a targeted capability build across each Auto Comp cluster, along three vectors:

B.1. Advanced Testing and Validation Ecosystem

- Cluster level testing and validation centers to enhance quality and speed of validation processes. This can be unlocked through targeted government support (e.g., in the form of viability gap funding or facilitating Public Private Partnerships (PPP)
- Leverage automation, and digital and AI-driven quality assurance processes in line with requirements from global OEMs

B.2. Building World-Class Tooling Infrastructure

- Set up shared modern toolrooms in each auto cluster, allowing access to MSMEs for their requirements
- This can potentially be either a new business proposition for incumbent players, or an opportunity to extend existing toolroom capabilities to broader industry participants through a "toolroom as a service" model. Enhanced utilizations of toolrooms, in turn, can further drive capacity augmentation

B.3. Reskilling and Training on New-Age Auto Tech

- Establish/expand auto-focused reskilling centers (to train on areas such as Auto electricals and electronics, Mechatronics, Tooling engineering)
- Collaboratively design the program architecture with global auto OEMs and Tier-1s; explore local ITI sponsorship by global OEMs

Activating these shared capabilities of testing centers, toolrooms and deeply specialized skilling centers across auto clusters can help India leapfrog on critical capabilities, and greatly diminish the scale disadvantage we have versus other global hubs. These will require adequate support from the Government (in the form of viability gap funding, or facilitating PPPs), but might in time, also emerge as lucrative business opportunities for incumbent Auto Comp players.

Building up on these foundational capabilities along with targeted adoption of digital and automation in the current manufacturing process (towards Industry 4.0 adoption) can lead to superior quality and reliability from Indian players.

- Further, the industry can also benefit from a Bharat Quality Standard, defined in line with global benchmarks and expectations. This is an ambitious initiative and driving/enforcing the adoption of this standard among auto OEMs operating in India will require close collaboration with Indian OEMs, global OEMs present in India and orchestration by bodies like ACMA, SIAM and Govt. agencies. Success of this initiative can help Auto Comp players fast-track their journey in global quality certification.

C. Advance Design & Innovation Capabilities, & Embed Sustainability:

Policy and fiscal support for indigenous innovations, advancing tech maturity and sustainability agenda among the Indian Auto Comp

With rapid electrification and electronification in vehicle architectures, it becomes more critical for the Indian component industry to invest in design, technology development and innovation. Further, as we look to emerge as one of the "last men standing" on the global ICE components stage, deepening local design capabilities and accelerating NPD cycles in the industry will be a big priority.Fostering this innovation culture and building indigenous technology will require:

C.1. R&D Investments with Government Fiscal Incentives

- Government's fiscal support and incentives towards R&D investment by Indian Auto Comp players, particularly in Auto Electronics, xEV powertrain and Software Driven Vehicles (including booster incentive for global OEMs and Tier-1s migrating R&D facility to India)
- Policy framework to accelerate and incentivize local capability build through tech transfers/partnerships with mandate on exports out of India, and/or a diminishing royalty model

C.2. Tech Parks for Global Engineering Collaborations

- Development of Auto-focused Tech Park / GCCs with embedded R&D facilities for Indian and global players
- Incentivize global OEMs to migrate their R&D and engineering capacity to India, enabling the cross-pollination of capabilities
- Establish Automotive and Manufacturing Innovation Accelerators, situated closer to premier institutions to attract top talent, and foster collaboration across academia, startups, Indian and global OEMs, and Auto Comp players – this can be orchestrated by industry bodies (such as ACMA, SIAM, IPO forums) with investment support from the Government

C.3. Industry Readiness towards ESG and Sustainability

- Industry-wide framework for Auto Comp players to start tracking their ESG footprint, in line with emerging requirements from global OEMs
- Cluster-level collaborative efforts to improve across ESG dimensions (e.g., pooled renewable energy capacity build-up in auto clusters)
- This can benefit from facilitation by ACMA on driving awareness and kickstarting the players' ESG journey

01 Introduction

Introduction

India's auto components industry stands on steady ground today, having witnessed sustained growth and transformation in the last decade. Since FY14, the sector has witnessed a CAGR of ~8% and emerged as a key pillar of the country's manufacturing sector. Today, it contributes $74 Bn in local manufacturing output and generates employment for over 5 Mn people annually. A significant focus on localization has been a major driver of this progress, with the industry now catering to 70% of Indian auto industry requirements.

Further, the thrust on exports culminated in a watershed moment in FY24 when the sector achieved a trade surplus of ~$300 Mn for the first time. This milestone marks a dramatic turnaround from FY19, when the industry faced a net trade deficit of $2.5 Bn. Such a significant shift has been catalyzed by the concerted efforts of industry stakeholders, supportive government policies, and a strategic push towards global competitiveness.

While this achievement is significant, it also lays the groundwork for even more ambitious goals. India's share in the global auto component trade stands at ~2%, whereas Mainland China's share is ~12% - highlighting a substantial opportunity for expansion. By leveraging structural shifts in the industry, including increasing electronification, vehicle electrification and supply chain diversification, India can position itself as a major global supplier of auto components.

This report outlines a strategic roadmap to achieve the sector's next big target - $100 Bn in exports - by analyzing India's evolving role in global trade, key milestones already achieved, and the steps required to unlock its full export potential.

Auto-Components Industry Overview

$74 Bn
Industry Value

7.8 %
CAGR from FY14-FY24

5 Mn
People Employed

1.8%
India's share in global trade

Source: ACMA website and reports, BCG analysis
India specific values

02

Lay of the land

Global auto comp trade landscape

2.1. Global trade dynamics and India's standing

Global Auto Component Trade: $1.2 Tn opportunity

Global auto component trade reached $1.2 Tn in 2023, with steady growth driven by rising demand and evolving vehicle technologies. Over 40% of trade volume is concentrated in five key product categories, including engines and its components, gearboxes, motors, wiring harnesses, and cooling systems.

Trade Dynamics: What is really addressable for the Indian industry

The global auto component trade is structured around 12 key geographic clusters (Exhibit 2), each influenced by localized production hubs, trade agreements, and tariff regimes. Over the past five years, the composition of global trade has remained stable, with approximately 50% of trade occurring within clusters (intra-cluster) and the remaining $595 Bn involving cross-cluster (inter-cluster) trade. This inter-cluster trade represents a significant growth opportunity for emerging exporters such as India, as countries look to diversify supply chains and reduce dependencies.

Where we stand today: 3.6% of the $595 Bn global inter-cluster trade market

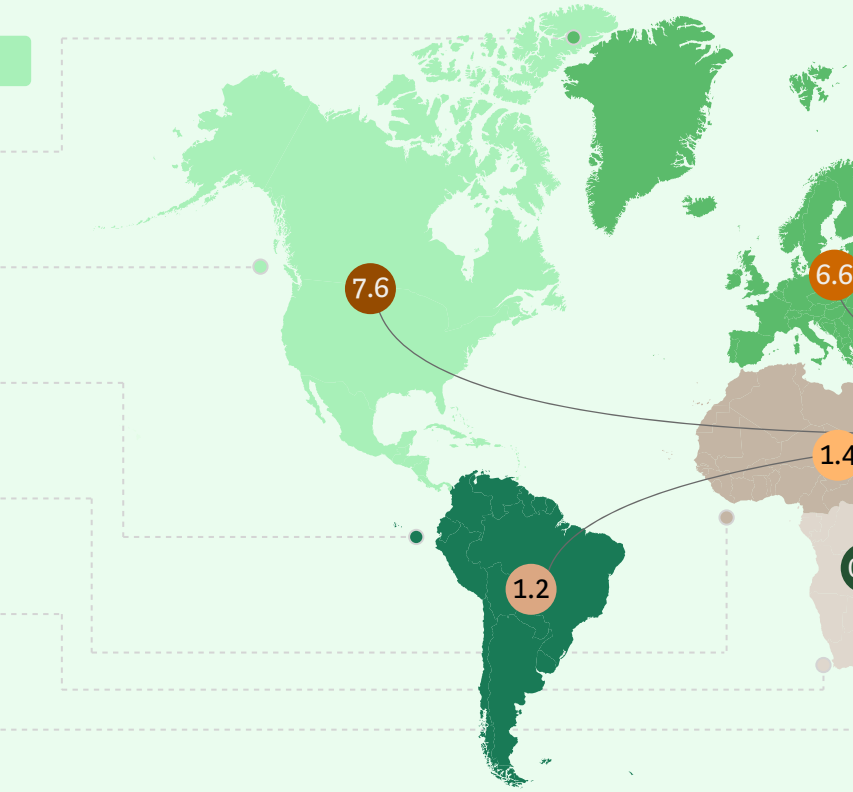
India, with annual exports of ~$21 Bn, holds a 3.6% share of the inter-cluster trade. This is significantly lower than China, which commands ~25% share.

Among the 12 global clusters, North America and Europe dominate inter-cluster trade, accounting for $170 Bn and $151 Bn in imports, respectively. These regions present the most promising opportunities for India to scale up its exports. India has a strong position to build on in these markets with a share of >4%. At the same time, markets such as Japan, South Korea, Oceania, and China, albeit smaller in trade potential, are whitespaces for India, with our share at 1-1.5% (Exhibit 2).

Exhibit 2: Geographic Trade Clusters: Imports, Exports, and India's Share of Global Trade (2

Global trade structured around 12 geographical clusters

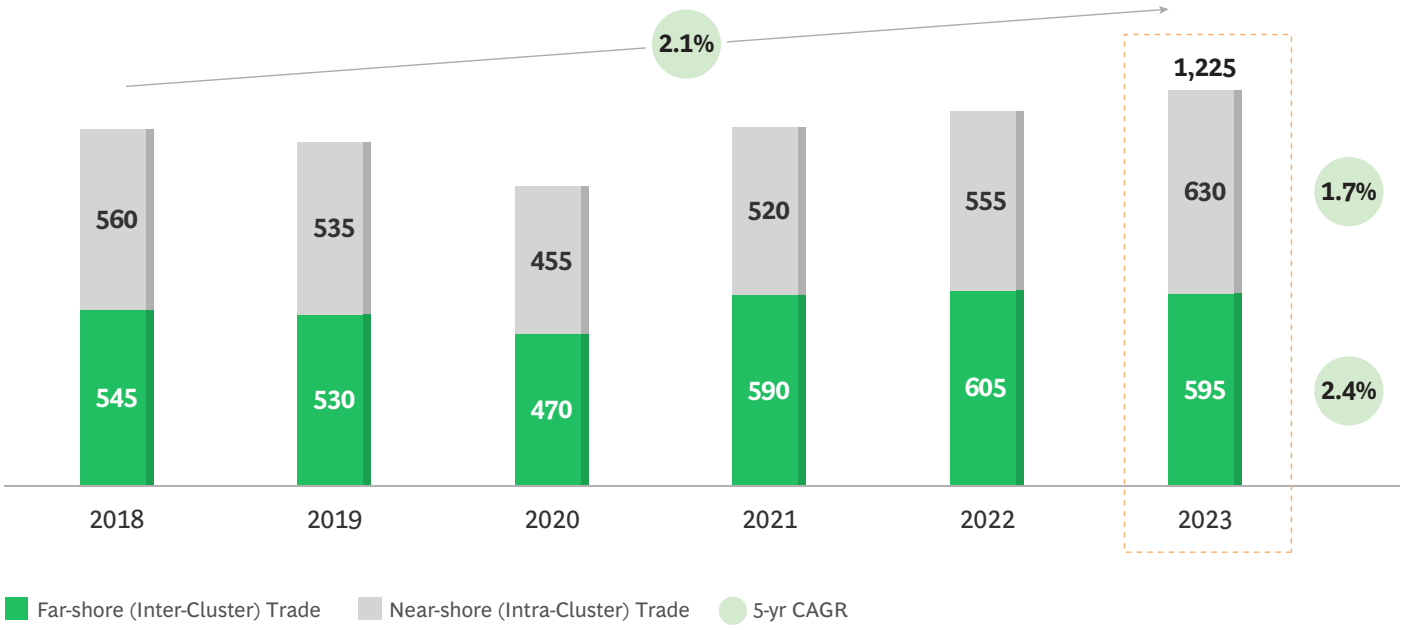
Country	Export	Import	India's Share
Europe[1]	$149 Bn	$151 Bn	4.4%
North America (NAMR)	$58 Bn	$170 Bn	4.5%
Latin America (LATAM)	$8 Bn	$35 Bn	3.4%
METNA[2]	$29 Bn	$34 Bn	4.1%
Sub-Saharan Africa (SSA)	$2.5 Bn	$8 Bn	4.7%
India	$21.2 Bn	$20.9 Bn	-



1.Includes United Kingdom **2.METNA** - Middle East, Turkey and North Africa **3.CIS** - Includes former Soviet Republics such as Russia, Ukraine, and Kazakhstan **4.Oce**

Note: CIS imports data unavailable for 2022 and 2023; Taiwan accounts for another $18 Bn exports and $9 Bn imports.
Source: BCG analysis; UN Comtrade

Exhibit 1: Global Auto Components Trade: Intra-Cluster vs. Inter-Cluster Split ($Bn, 2018-23)



Source: BCG analysis, UN Comtrade
Note: Near-shore (Intra-cluster) means trade within a cluster, Far-shore (Inter-cluster) means trade among clusters

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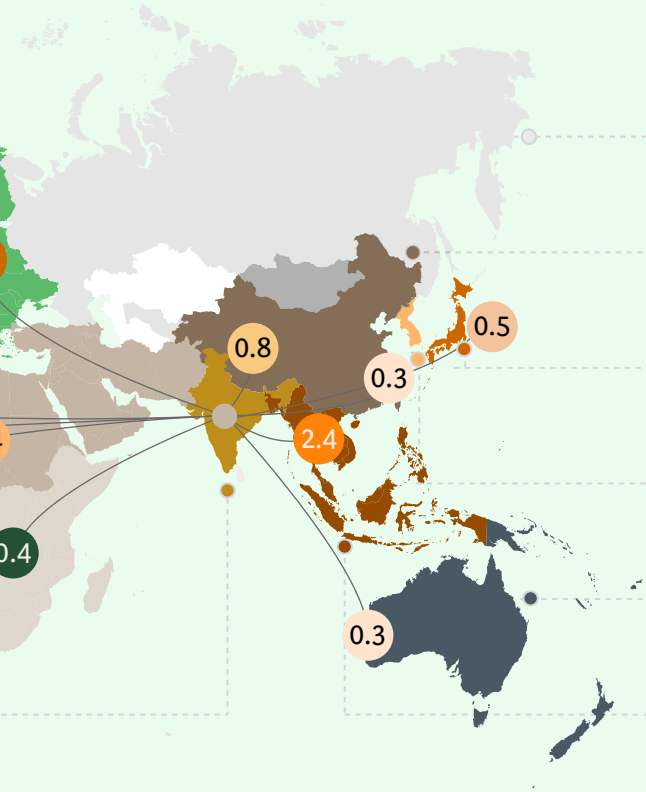


Country	Export	Import	India's Share
CIS[3]	$1.6 Bn	-	-
Mainland China	$149 Bn	$63 Bn	1.3%
Japan	$74 Bn	$36 Bn	1.3%
South Korea	$38 Bn	$25 Bn	1.3%
Oceania[4]	$1.4 Bn	$14 Bn	1.3%
ASEAN	$44 Bn	$59 Bn	4.0%

ania - Region including Australia, New Zealand, Melanesia, Micronesia, and Polynesia

x.x India's Auto Component Export ($ Bn)

2.2. India trade balance: From deficit to surplus - turning a new leaf

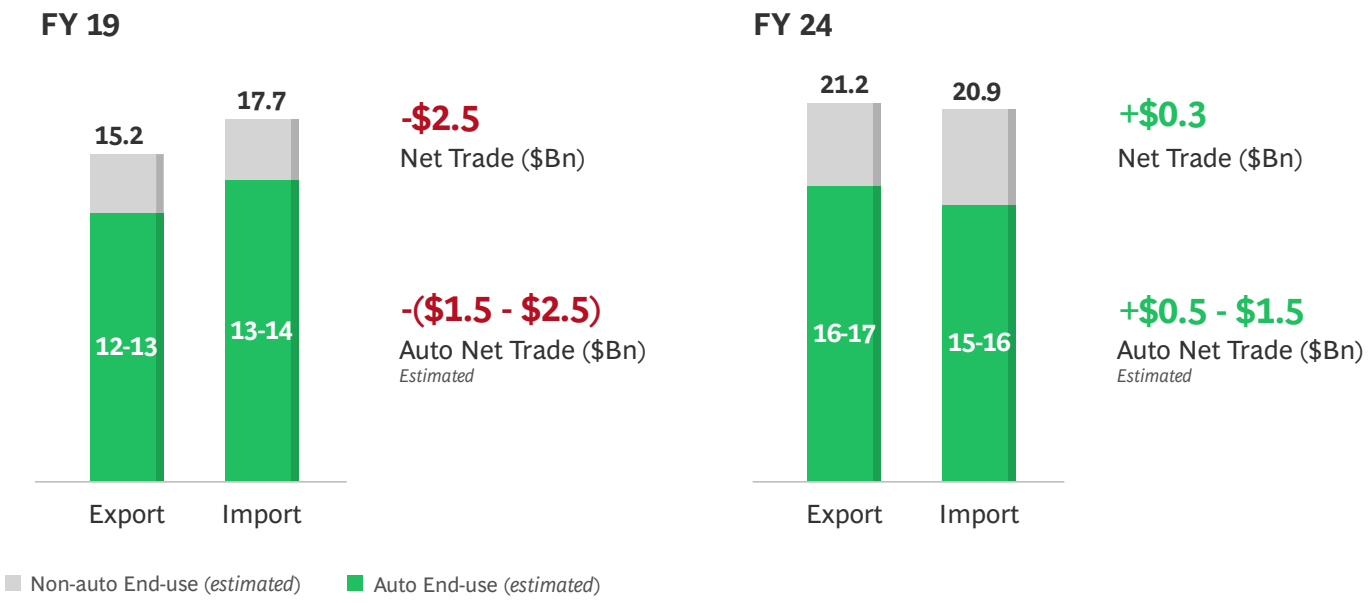
From deficit to surplus: A remarkable turnaround in FY24

India's auto component industry has witnessed a pivotal transformation, achieving a net trade surplus of ~ $300 Mn in FY24 - a significant reversal from the net trade deficit of $2.5 Bn in FY19 (Exhibit 3). This notable shift underscores the enhanced global competitiveness of Indian exports. The progress has been primarily fueled by expanded domestic manufacturing capacities and targeted governmental policies designed to curtail import reliance, propelling the sector towards growth and international market penetration.

A deeper look: Pure auto applications see a larger trade surplus of $0.5-1.5 Bn

India's trajectory towards a trade surplus is even more pronounced within pure auto applications. By isolating auto-specific end uses the data reveals a substantial shift- from a $1.5-2.5 Bn deficit in FY19 to a surplus ranging between $0.5-$1.5 Bn in FY24 (Exhibit 3). This excludes components used in other sectors such as power generation, renewable energy, and home appliances. Notably, less than 60% of exports and imports for components such as gears, motors, and fasteners are auto specific, unlike gearboxes, axles, brakes and components, which predominantly serve the automotive industry. For a comprehensive breakdown of key components, please refer to Appendix 1.

Exhibit 3: India's Auto Component trade balance for overall and auto-end use ($Bn)



Source: ACMA, Volza trade data, BCG analysis

Drivers of change: What the sector has accomplished in the last decade

1 Driving import substitution: Leveraging policy support to enhance localization

India's auto component imports have declined in select categories, driven by a combination of policy support and targeted efforts by the sector. Five product categories have seen a measurable substitution of imports- wheels/rims, engines, steering parts, gears, and rubber products. This has been achieved through targeted actions aimed at boosting local manufacturing capacity and cost competitiveness.

Some notable successes:

- **Wheels/rims:** The passenger vehicle segment has witnessed a significant shift towards a preference for alloy wheels over steel wheels. Historically dominated by Chinese manufacturers, the Indian alloy wheel industry has experienced substantial growth following the imposition of ADDs[1] ranging from $0.08/kg to $2.15/kg on Chinese imports in 2015. This measure has empowered leading domestic manufacturers to expand operations into alloy wheel manufacturing. Over time, as domestic production capacity and technological advancements have improved, Indian OEMs have increasingly turned to local sourcing for their wheel requirements.

1. Note: ADDs - Anti-Dumping Duties

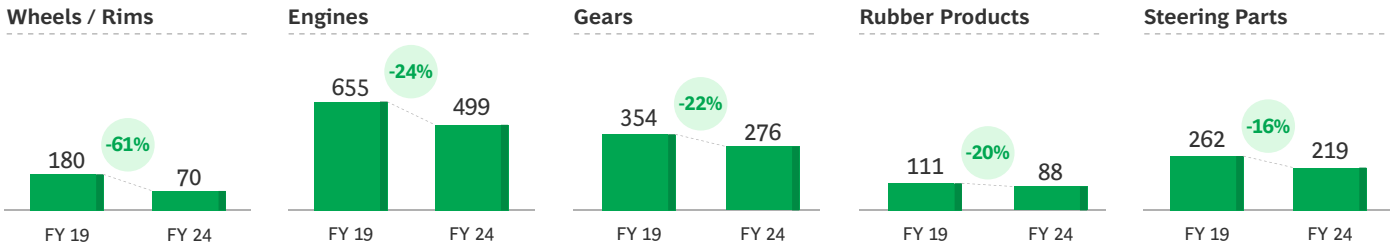
- **Engines:** Global OEMs are intensifying their efforts to localize engine production, evident from a significant reduction in engine imports, which have decreased by approximately $150 Mn. Notably, the Indian arm of a European OEM has contributed $100 Mn to this reduction in imports. This shift has been facilitated by the group's strategic emphasis on enhancing local sourcing, reducing reliance on European bases.

The outcome of these measures ensured that imports in the auto-specific sector grew only at 12%, compared to exports which have grown 34% since FY19.

Exhibit 4: India's import reduction in key components

Values in $Mn

Auto end-use Imports
Estimated



Note: Auto-end use imports refers to imports by companies that operate in the auto industry. Excludes imports by companies in other sectors like renewable energy, home appliances, aviation.
Source: Ministry of Commerce Trade Data, Volza trade data, BCG Analysis

2 Catalyzing export excellence: Harnessing technology, scale, and quality

India's auto component exports have experienced steady growth, driven by focused efforts of the industry. Five product categories have seen a significant growth in exports since FY19 - fasteners, axles, engine components, motors, and gears. This has been achieved through quality advancements among existing players and strategic joint ventures with international companies.

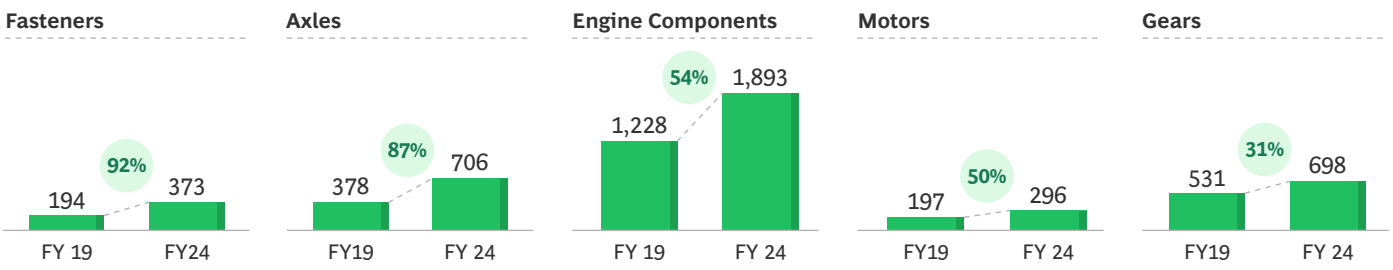
- **Axles:** The industry has seen an increase in joint ventures with leading international Tier-1 suppliers to mitigate demand volatility and address logistical challenges effectively. A notable example, includes a leading Indian axles player, which has capitalized on a JV, leveraging its global partner as both a global buyer and a distributor. This strategic alignment has enabled it to concentrate on manufacturing high-quality, cost-competitive axle components, resulting in a doubling of its exports over the past five years.

- **Gears:** Acquisitions and partnerships have unlocked access to new process technologies, and enhancements in product portfolio and quality. For example, a leading differential gears supplier has effectively positioned itself as a supplier of differential gears to one of the top global EV OEMs. This placement is attributed to its strategic acquisitions (including a precision-forging asset) from global majors, which provided access to advanced warm forged technology and improved tooling capabilities.

Exhibit 5: India's export growth in key components

Values in $Mn

Auto end-use Exports
Estimated



Note: Auto-end use exports refers to exports by companies that operate in the auto industry. Excludes exports by companies in other sectors such as renewable energy, home appliances, aviation
Source: Ministry of Commerce Trade Data, Volza trade data, BCG Analysis

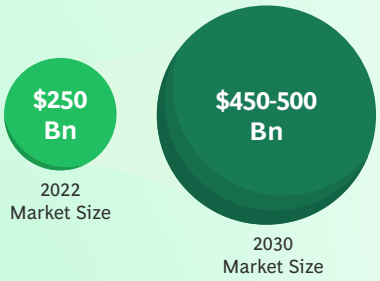
2.3. Backdrop: What's happening in the global auto landscape

This section explores four pivotal trends shaping the future of the auto component industry - electronification, electrification, light weighting and supply chain shifts.

These trends are fundamentally transforming production processes, auto component demand, and market dynamics.

Key trends shaping the future of the Auto Component industry

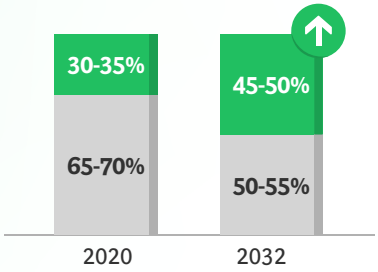
Automotive electronics market to grow to ~$500 Bn by FY30



Global automotive electronics market is expected to double by 2030

Share of electronics in vehicle costs to be ~50% by FY30

Car cost split



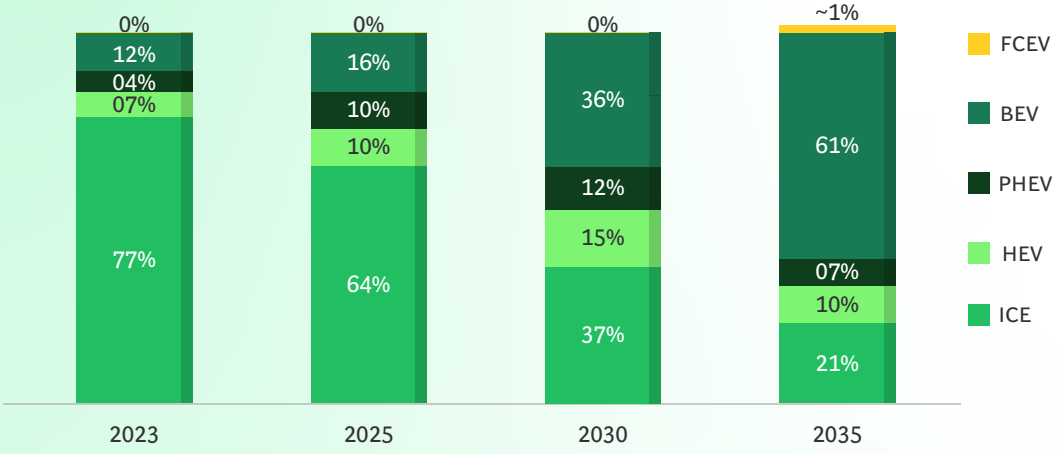
Increase driven by ADAS, Infotainment, & Connectivity solutions across vehicle categories

Electronification 01
Increasing share in vehicle costs

Electrification 02
Rising EV share of new car sales

Plug-ins (BEV & PHEV) to contribute ~50% of global new light vehicle sales by 2030

Global New Light Vehicle Sales

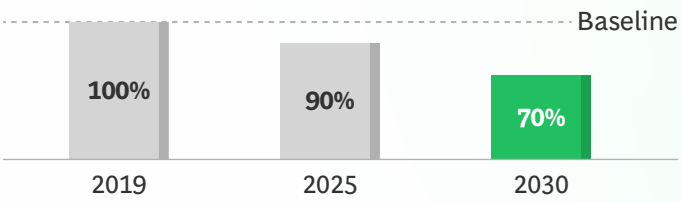


- BEVs share in light vehicle sales to increase to 5x by 2035
- PHEVs, HEVs, and FCEVs combined share to increase by 150% by 2030

Note: FCEV - Fuel Cell Electric Vehicle, BEV - Battery Electric Vehicle, PHEV - Plug-in Hybrid Electric Vehicle, HEV - Hybrid Electric Vehicle, ICE - Internal Combustion Engine

Average new vehicle kerb weight to drop by 30% by 2030 vs 2019

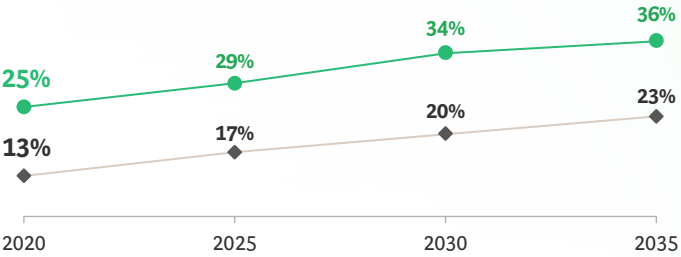
Vehicle kerb weight (%)



- Light weighting trend underway to meet CO_2 regulation, safety & convenience features gradually increased weight
- Trend to be sustained as xEV body-in-white structure further adds weight and impacts vehicle range

Light weighting imply use of lighter yet more complex material, driving simulation needs

Average vehicle material (% by kerb weight per vehicle)



- Increasing use of new metals with lower weight vs. traditional steel (e.g., Aluminum has a ~3x lower density than steel)
- These new metals have more springback and deformation, implying more complex forming process with more iterations

Specialty Steels Aluminum

03 Light Weighting
Continuous weight reduction

04 Supply Chain Shifts
Geopolitics changing global trade

US tariff dynamics

Additional tariffs put pressure on trade with partners such as China, $427 Bn exports in 2023, and Mexico, $475 Bn exports, but enhances opportunity for re-shoring

Strengthening of new trade blocs

As China's trade with the West slows, it accelerates with Russia, ASEAN, Africa & Mercosur, and is expected to grow at twice the global trade CAGR this decade

EU focus on allies & growing markets

Geopolitical tensions, energy prices, and sustainability measures decreasing competitiveness. Slowing trade with China shifting focus towards strategic partners such as the US, and growing markets such as India & Africa

Overall and not auto specific

Source: Great Powers, Geopolitics, and the Future of Trade , Ducker Worldwide; European Aluminum Association; Center for Automotive Research (CAR); Expert interview, BCG Analysis

03

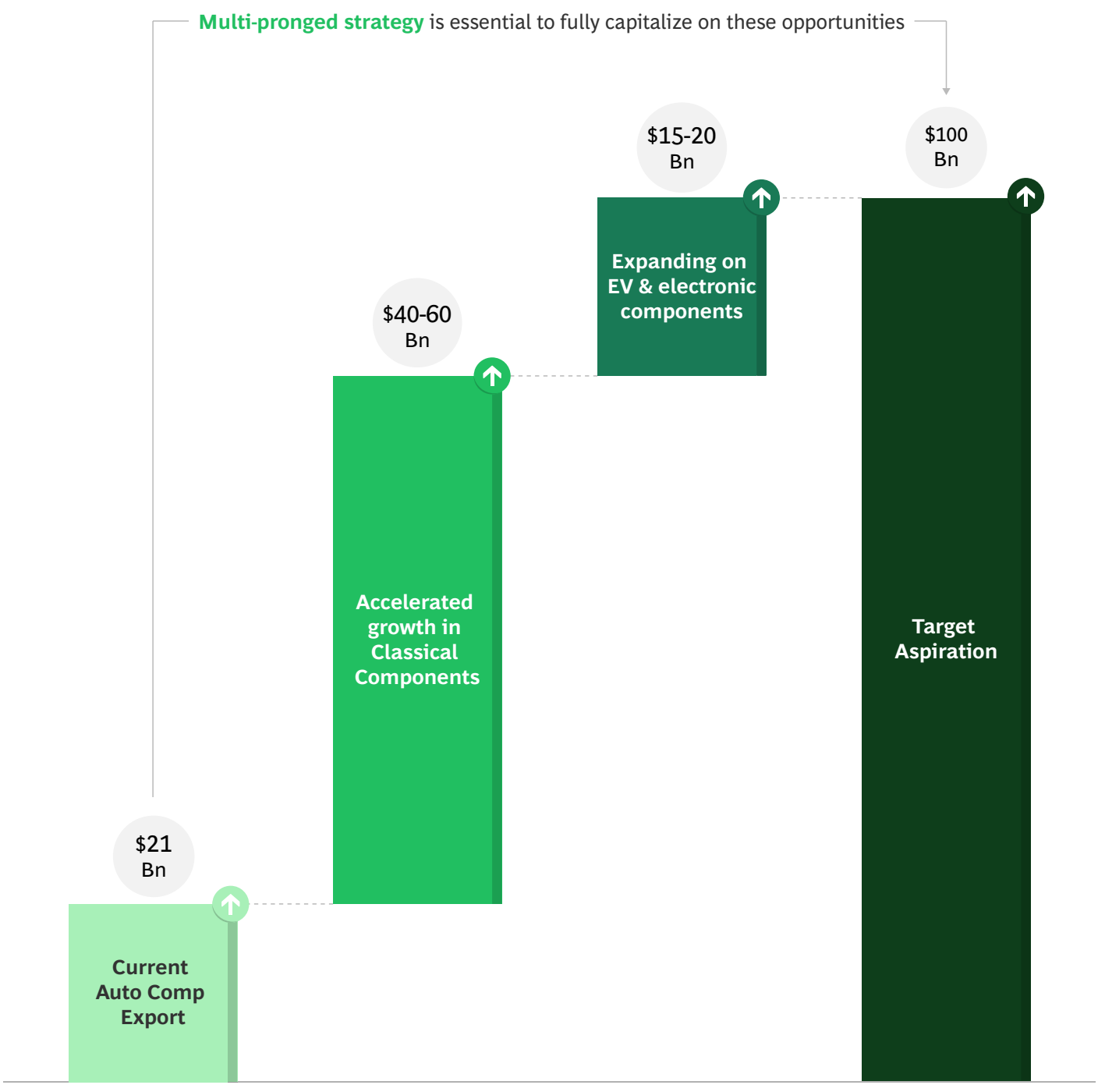
Roadmap to $100 Bn exports

India's auto component exports reached $21.2 Bn in FY24, 1.4x of the $15.2 Bn exports in FY19. This growth underscores the rising competitiveness of Indian exports, driven by enhanced domestic manufacturing capabilities, targeted policy interventions, and a strategic realignment of supply chains by global OEMs.

The sector has set a bold aspiration of reaching $100 Bn in exports. This will require the country to emerge as an export hub across traditional and emerging segments, tapping into new opportunities created by megatrends such as electrification and electronification, while building upon the strong foundation of classical vehicle components.

The road to $100 Bn exports will hinge on two critical factors - (i) a 2-3x growth in classical vehicle components (ICE and carry-over components to xEVs) and (ii) building an exports ready foundation in electrification and electronification opportunities.

Exhibit 6: India's roadmap to $100Bn exports



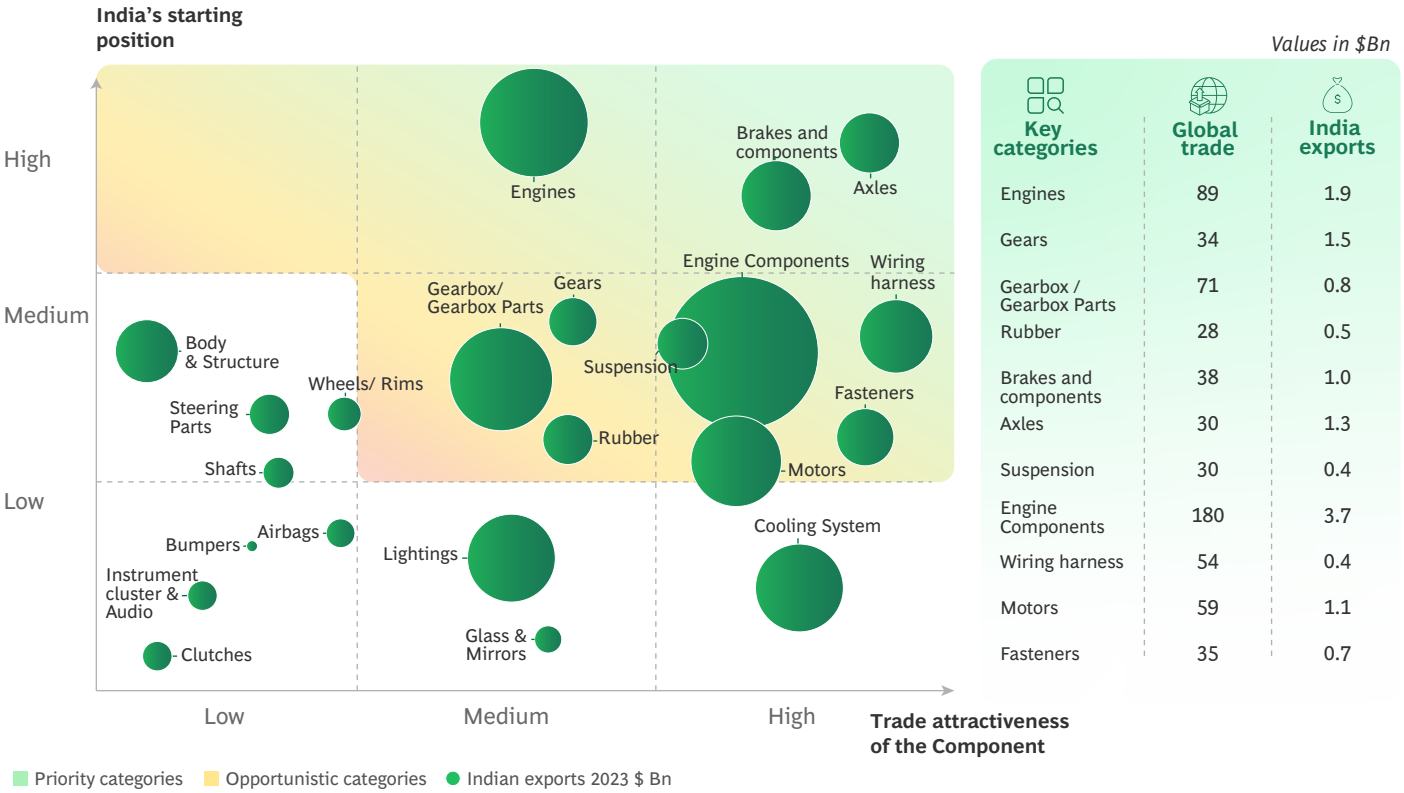
3.1. Doubling down on Classical Vehicle Component Exports

Classical vehicle components (Classic and carry-over components to xEVs) are a core pillar of India's component manufacturing capabilities. Given our increasing competitiveness, global trends on electrification, the Indian auto component sector has an opportunity to emerge as a global "last man standing" for classical vehicle components.

To capitalize on the classical vehicle component export opportunities, India must focus on:

- **Doubling down on priority product families and further strengthening cost competitiveness:** 11 product families have been identified as critical for export growth basis global market attractiveness and India's starting position (Exhibit 7). These represent a $650 Bn inter-cluster trade opportunity for India.
- **Prioritize target markets:** The Europe and North America remain the top priority markets due to their mature automotive industries, high vehicle volumes, and increasing demand for cost-effective, high-quality components. For the 11 priority products, Europe and North America represent 25% of the inter-cluster trade opportunity.
- **Bring targeted capabilities:** For both OEMs/Tier-1s and also for aftermarket customers.

Exhibit 7: Analysis of classical vehicle components to identify high export growth potential for India



Values in $Bn

Key categories	Global trade	India exports
Engines	89	1.9
Gears	34	1.5
Gearbox / Gearbox Parts	71	0.8
Rubber	28	0.5
Brakes and components	38	1.0
Axles	30	1.3
Suspension	30	0.4
Engine Components	180	3.7
Wiring harness	54	0.4
Motors	59	1.1
Fasteners	35	0.7

India's starting position is considered 'High' for products where exports exceed $0.5 Bn, global share is >1%, and CAGR is >7%, 'Medium' where at least one of these conditions is met, and 'Low' for all other cases

- To establish India as a competitive export hub, it is critical to assess India's current standing on essential supplier parameters that define global competitiveness — such as cost, quality, engineering capabilities, and technological advancements.

The next section focuses on India's cost competitiveness, benchmarked against global counterparts, and identifies the key gaps that need to be bridged for the country to achieve its export ambitions.

3.1.1. Cost Competitiveness: India is cost competitive versus key exporters, except the Mexico to US trade

German market dominated by European players; marginal cost edge for India

Eastern European countries today dominate German imports across components. These geographies are typically 2-15% more expensive than India, except for gears where Italy is 25-30% more expensive. Despite higher logistics costs, India maintains a cost advantage on account of lower manpower and energy costs.

However, India's share of exports is currently limited to 1-2% for axles, brakes and components, suspension, and fasteners; less than 0.3% for steering systems and wheels/rims. Capitalizing on our cost competitiveness for enhancing Indian auto component exports will require an improvement in product quality and competitive service levels (e.g., turnaround time) vis-à-vis Eastern European geographies.

US market dominated by Mexico and China; Mexico 2-5% cheaper and China 20-25% more expensive than India

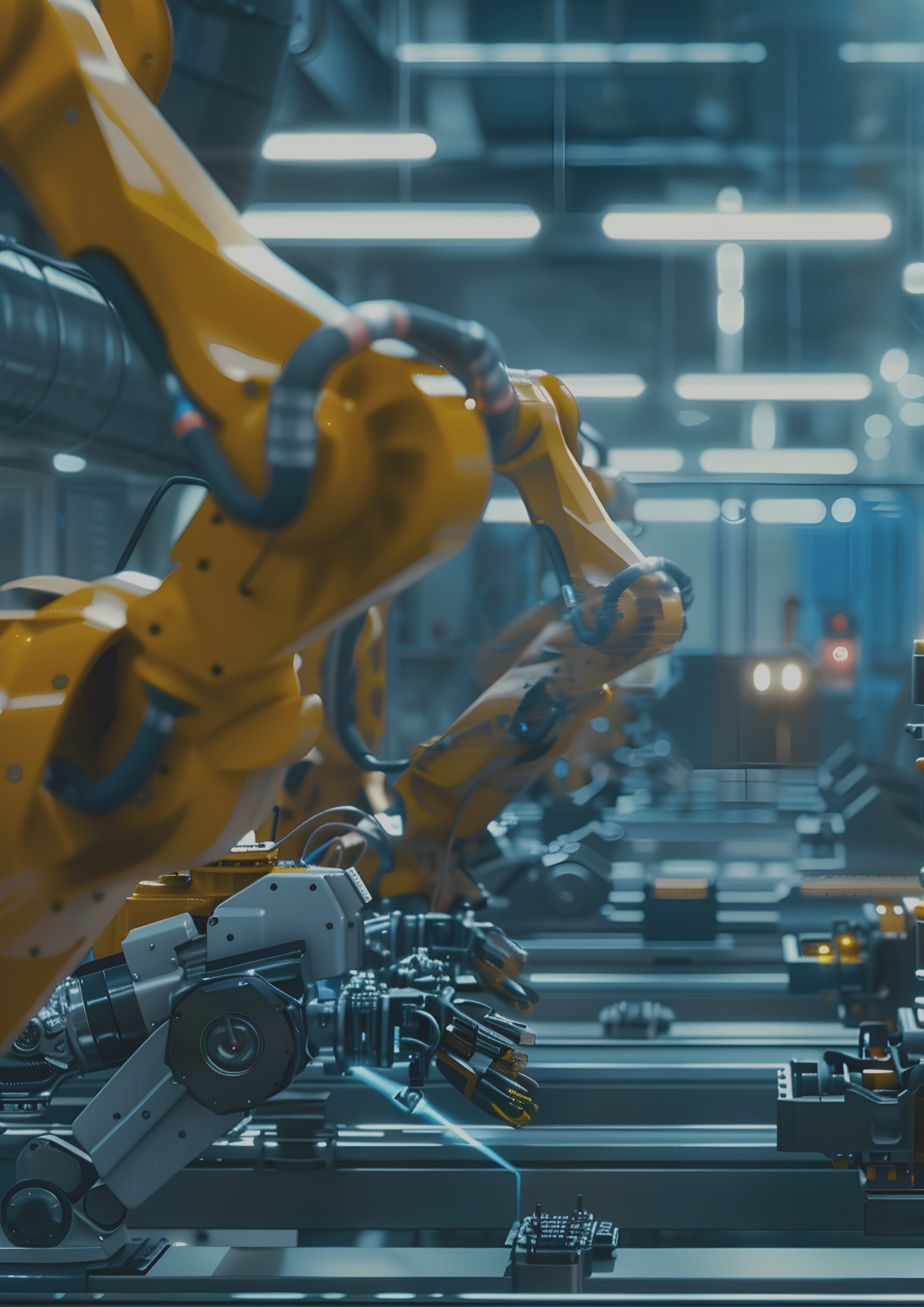
Mexico is among the top exporters with 30%+ share in axles, brakes and components, steering systems, and wheels/rims. It is 2-5% cheaper than India due to lower logistics, energy, and tariff costs across components (Exhibit 10). China, however, is 20-25% more expensive than India across major component categories (assuming similar material costs), largely due to additional 25% tariffs imposed under section 301 of the US Trade Act. India currently holds a modest 2-7% share in these components.

Currently, trade within North America is facing major disruption triggered by impending sharp US tariff increases on goods imported from Canada, Mexico, and China. On 1 February 2025, US President Donald Trump issued executive orders imposing tariffs of 25% on all imported Mexican and Canadian goods except for energy and critical minerals, which would attract a tariff of 10%.

An additional 10% tariff on Chinese goods was also ordered, in addition to the previous hikes. While the US tariffs on Mexico and Canada have been postponed for one month as the US negotiates with each country over border security and other issues, the tariff of 10% on Chinese imports has now come into effect. If fully implemented, for countries such as Canada, Mexico, and China, the auto and auto component sector will be the hardest hit - with $36 Bn in added cost in auto components and $30 Bn in automotive vehicles.

Past tariff regimes (e.g., Section 301 of US Trade Act) had led to a decline in imports from China, whose auto component exports fell from $31 Bn in 2018 to $26 Bn in 2023 while US imports grew at 4% CAGR. Some key components that saw the sharpest decline include fasteners (25% decrease) and wheels/rims (30% decrease). Once fully implemented, these tariffs could erode Mexico's cost advantage, creating new opportunities for Indian auto components in the global market.

This analysis accounts for cost variations related to energy, labor productivity and wages, logistics, and tariffs. It does not consider changes in material costs arising from geographical differences or production scale



Comparative Landed Cost Analysis: India vs. Top Exporters

Methodology for landed cost assessments

A comprehensive cost framework is developed using factor cost breakup in a reference country (e.g., the USA) considering key cost components such as labor, energy, materials, manufacturing, and operational expenses. To translate these ex-factory costs to other geographies, cost modifiers for energy and labor are applied, while materials, manufacturing, and operational costs are considered to remain relatively stable due to minimal variation.

The energy modifier accounts for differences in gas and electricity prices—Japan energy costs, for instance, are 2.4 times higher than those in the US (Exhibit 8). Similarly, the labor modifier adjusts for wage disparities and productivity differences—India and Mexico's labor costs are ~70% lower than those in the US when adjusted for productivity (Exhibit 8).

Additionally, logistics costs, based on the most cost effective transportation mode, and tariff costs for the relevant HS code (including Most Favored Nation rates, bilateral agreements and punitive duties) are applied to determine the final landed cost of a component exported from any country to the base country.

Exhibit 8: Model construct for landed costs-Incorporating tariffs, logistics, and factory cost multipliers

Illustrative calculation of relative landed cost in the USA and Germany for axles and axle components

Note: The cost variations shown are for top exporters for axles and axle components as an illustration, with analysis conducted on 40 top exporting countries. Adjusted energy costs in the graph are illustrative of commercial electricity costs. This analysis accounts for cost variations related to energy, labor productivity and wages, logistics, and tariffs. It does not consider changes in material costs due to from geographical differences or production scale.

The US levies extra 25% punitive duties on China since 2018, under section 301 of the US Trade Act.

Sources: Factors cost structure: AWS Systemtechnik GmbH, Expert interview; Productivity-adjusted labor- World Bank, International labor organization; Energy -International energy agency; Logistics: Drewry world container index; Tariffs: World Trade Organization, MacMap

Illustrative assessment: Axles and axle components

For axles, India and Mexico have similar ex-factory costs, while Eastern European countries (such as Austria and Poland) are 2-5% more expensive. This is because India has one of the lowest productivity-adjusted labor cost, and energy cost in the world (Exhibit 8).

Import into Germany: The total landed cost from Austria and Poland are 2-5% lower than producing in Germany itself, as energy costs are almost half (Exhibit 9). India's landed cost is estimated to be 2-5% lower than these Eastern European countries. However, these countries also benefit from proximity to Germany, allowing lower turnaround times. As a result, 27% of Germany's axle and axle component imports come from Austria and Poland.

Import into the US: Mexico has the lowest landed costs to the US (2-5% lower cost than India). This is because of the free trade agreement and low logistics cost due to proximity. This cost advantage has allowed Mexico to dominate the US market with a 38% share of imports. However, recent developments in regional tariffs can displace Mexico's cost competitiveness.

Exhibit 9: Relative landed costs of axle and axle components in the United States & Germany

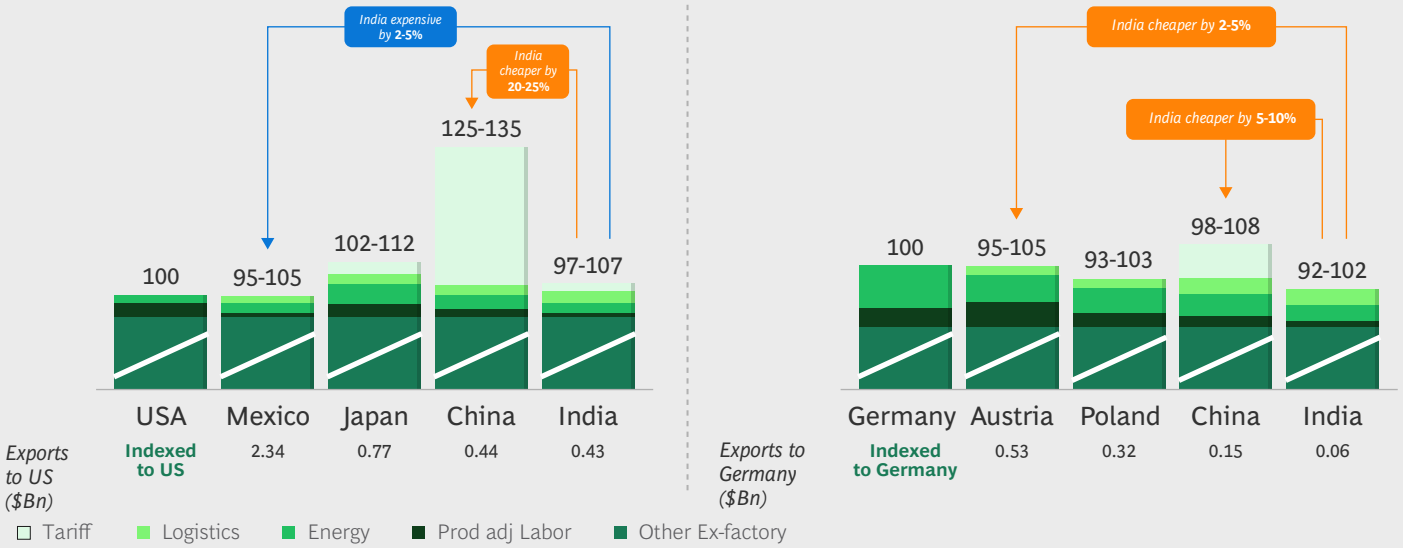


Exhibit 10: India's landed cost advantage vis-a-vis top exporters to the USA and Germany, across a set of components

		USA Market		Germany Market	
Components	**Key Buying Criteria**	**Top Exporter (Export %)**	**Landed cost delta** (vs. India)	**Top Exporter (Export %)**	**Landed cost delta** (vs. India)
Gears	1 Quality 2 Cost 3 Engineering & Tech	Germany 13%	India cheaper by **20 - 25%**	Italy 14%	India cheaper by **20 - 25%**
Axles	1 Engineering & Tech 2 Quality 3 Cost	Mexico 38%	India expensive by **2 - 5%**	Austria 17%	India cheaper by **2 - 5%**
Fasteners	1 Cost 2 Quality 3 Engineering & Tech	Mainland China 18%	India cheaper by **20 - 25%**	Italy 14%	India cheaper by **10 - 15%**
Wheels/ Rims	1 Cost 2 Quality 3 Engineering & Tech	Mainland China 35%	India cheaper by **20 - 25%**	Turkey 20%	India within **2%**
Steering system	1 Cost 2 Quality 3 Engineering & Tech	Mexico 63%	India expensive by **2 - 5%**	Romania 22%	India within **2%**
Brakes and components	1 Quality 2 Cost 3 Engineering & Tech	Mexico 44%	India expensive by **2 - 5%**	Poland 17%	India cheaper by **5 - 10%**
Suspension	1 Quality 2 Cost 3 Engineering & Tech	Mexico 41%	India within **2%**	Poland 13%	India cheaper by **5 - 10%**

Quality Cost Engineering & Tech

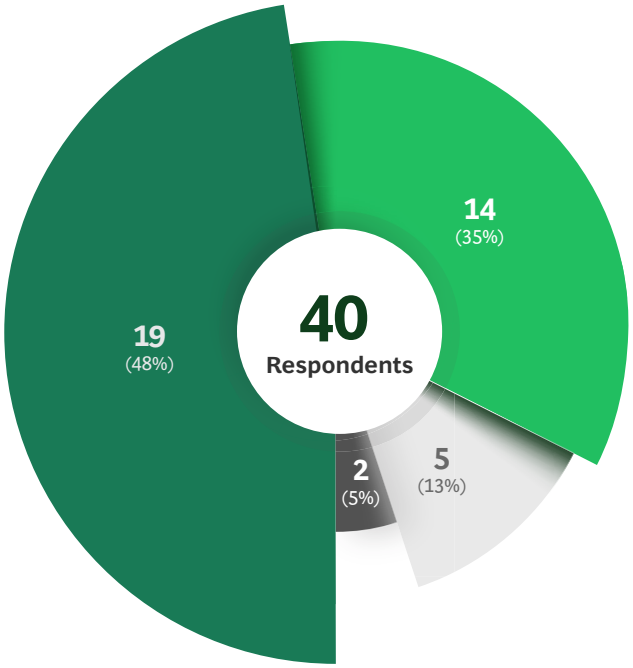
Note: For fasteners, Taiwan is the top exporter to the USA with 26% share; China ranks second. Key buying criteria based on a survey of 40+ procurement leaders across Global OEMs and Tier-1s
Source: Global manufacturing and landed cost comparator model, Volza trade data

3.1.2. Voice of the global customers

The good news - the survey indicates a growing acceptance of India as a supply hub. Notably, 80% of respondents expressed openness to sourcing from India (Exhibit 11), recognizing the country's increasing cost competitiveness and strengthening position in the global supply chain.

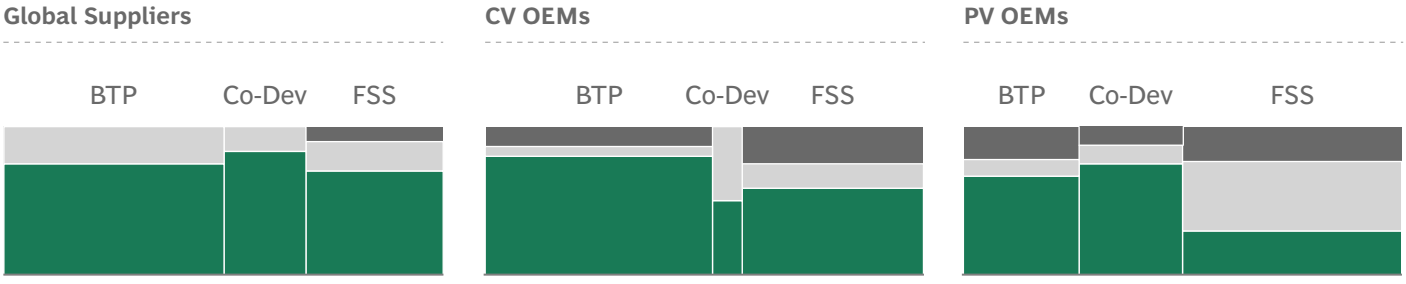
Exhibit 11: Global OEMs & Tier-1s openness to Indian sourcing

4 key buyer archetypes on openness to India



- **Open to India** for all categories
- **Open to India** for select categories
- **Not open to India, but open to LCC** for select categories
- **Not open to LCC** across categories

Exhibit 12: Openness to India sourcing across buyer x design ownership model



FSS (Full-Service Supplier): Indian supplier expected to manage end-to-end design, development, and manufacturing
Co-Dev (Co-Development): Indian supplier and OEM collaborate on design and development
BTP (Build-to-Print): Supplier manufactures components based on OEM-provided designs

Source: BCG proprietary survey; BCG analysis

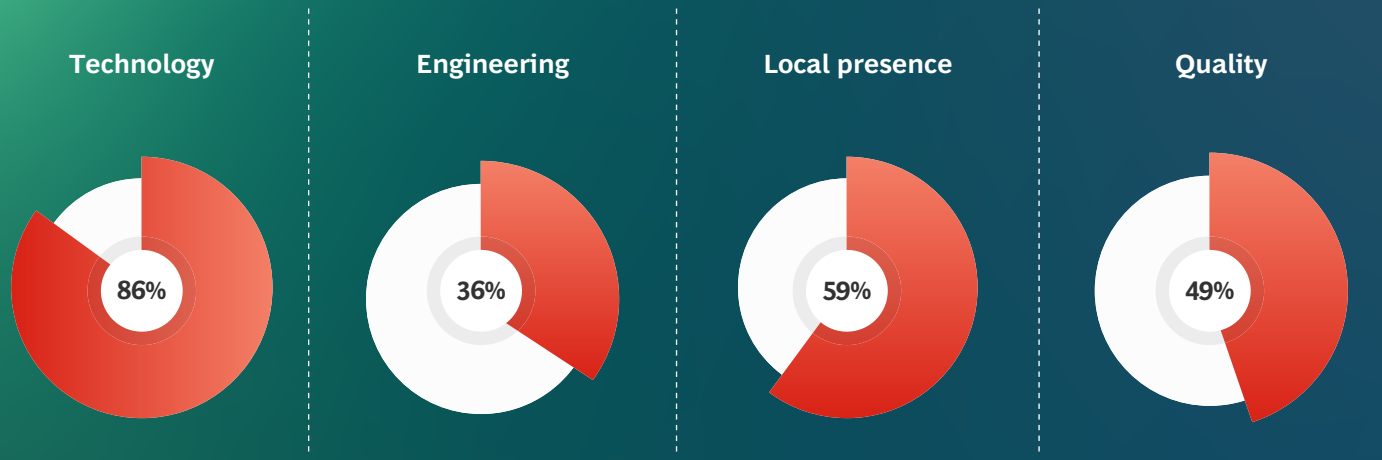
The degree of openness varies across the value chain, from suppliers to CV OEMs and PV OEMs, primarily influenced by two key factors. First, the engagement model mix should transition from Build-to-Print (BTP) to Co-development and further to Full System Supply (FSS) as we move from Tier-1s and CV OEMs to PV OEMs, with increasing selectivity in Co-development and FSS. Second, openness of OEMs given an engagement model declines as we move from suppliers to CV OEMs and PV OEMs, as the need for quality, precision, and technological sophistication progressively intensifies.

Overall competitiveness - where India stands today

For global buyers today, cost is only one of the considerations when selecting supply hubs and suppliers. Considerations on quality, innovation (including new product development), engineering, and local presence have significant importance – with relative weights varying across part families and depth of coverage (from BTP to FSS).

Exhibit 13: Key areas of improvement areas highlighted by some CPOs

% Respondents that believe India has room to improve in



Key areas of improvement

- Improve **development cycles/lead times**
- Improve **tooling & prototyping** speed and capabilities
- Improve speed to adapt to **new technology & innovations** - make R&D a strategic priority
- Improve **OEM collaboration**; scale skilled engineering capacity

- Build greater **speed and reliability** in TAT
- Invest in supply chain / WH **near OEMs** given long shipping routes
- Invest to improve **on-site engineering, sales & support presence**

- Drive **stronger quality control**, reduce quality-led rejections (e.g, manual inspections, dimensional inaccuracy, corrosion, raw material quality)
- Drive greater **consistency across batches** (addressing process gaps, automation)

“CPOs Speak

From Good to Great - Areas of Improvement for Indian Suppliers articulated by select CPOs

Global OEMs, through their International Procurement Offices (IPOs), contribute 20-30% of India’s auto component exports. Notably, 80% of CPOs interviewed are either already sourcing or open to sourcing critical components from Indian suppliers.

As OEMs and Tier-1s reassess their global supply chain strategies, India has positioned itself as a preferred destination due to its cost competitiveness, mature supplier base, and favorable trade relationships. To advance from $21 Bn in exports today to the $100 Bn aspiration, Indian players should double down on their strengths and focus on key strategic differentiators to emerge as leading global Auto Comp exporters.

A few areas of improvement for the broader Indian supplier ecosystem as articulated by select CPOs:

Strong cost competitiveness currently

- India is today cost competitive for majority of our components – in fact, we have started not only importing castings, but also gears and other engine components from India

Improve development cycles/lead times

- Indian suppliers, particularly small and mid-sized players, can accelerate development lead times
- Indian players need to step up on the technology curve – expand product design capabilities” and enhance speed of sampling and NPD cycles

Improve tooling and prototyping capabilities

- Improve access to high-precision tooling for faster time to scale, particularly for large orders
- Need to improve availability of skilled tooling engineers

Improve speed to adapt to new technology and innovations

- Invest more in training and development programs for advanced manufacturing techniques
- Can fast-track digital transformation and automation in manufacturing

Making R&D a strategic priority

- Need to invest in emerging technology for new product development

Improve warehousing presence near OEMs

- Further accentuated with forecasts variations– particularly in spare parts/aftermarket requirement

Build on-site engg, sales and support presence

- Indian suppliers need to build 24x7 on-site support to enhance customer service
- Timing is of the essence there to service engineering needs; need local support to avoid time zone differentials

Drive stronger quality control; reduce quality-led rejections

- Moving to automation in inspection and in process controls can lead to improving on reliability and quality, particularly for mid-small component players
- Strengthening access to high-grade raw material and quality inspections will minimize rejection rates

Drive greater consistency across batches

- Can improve time to scale for larger orders through automation in line and advanced tooling capabilities
- Some reliance on outdated equipment, restricting efficiency and impacting precision

3.2. Emerging Opportunities: Building India as a global hub for EV and Electric Capabilities

The shift towards electrification is reshaping the global auto industry, with electric and electronic components expected to account for 45-55% of a vehicle's value by 2030. As EV adoption accelerates worldwide, India stands at a pivotal moment - emerging both as a key domestic market and a competitive manufacturing hub for EVs, particularly in the two-wheeler (2W) and three-wheeler (3W) segments.

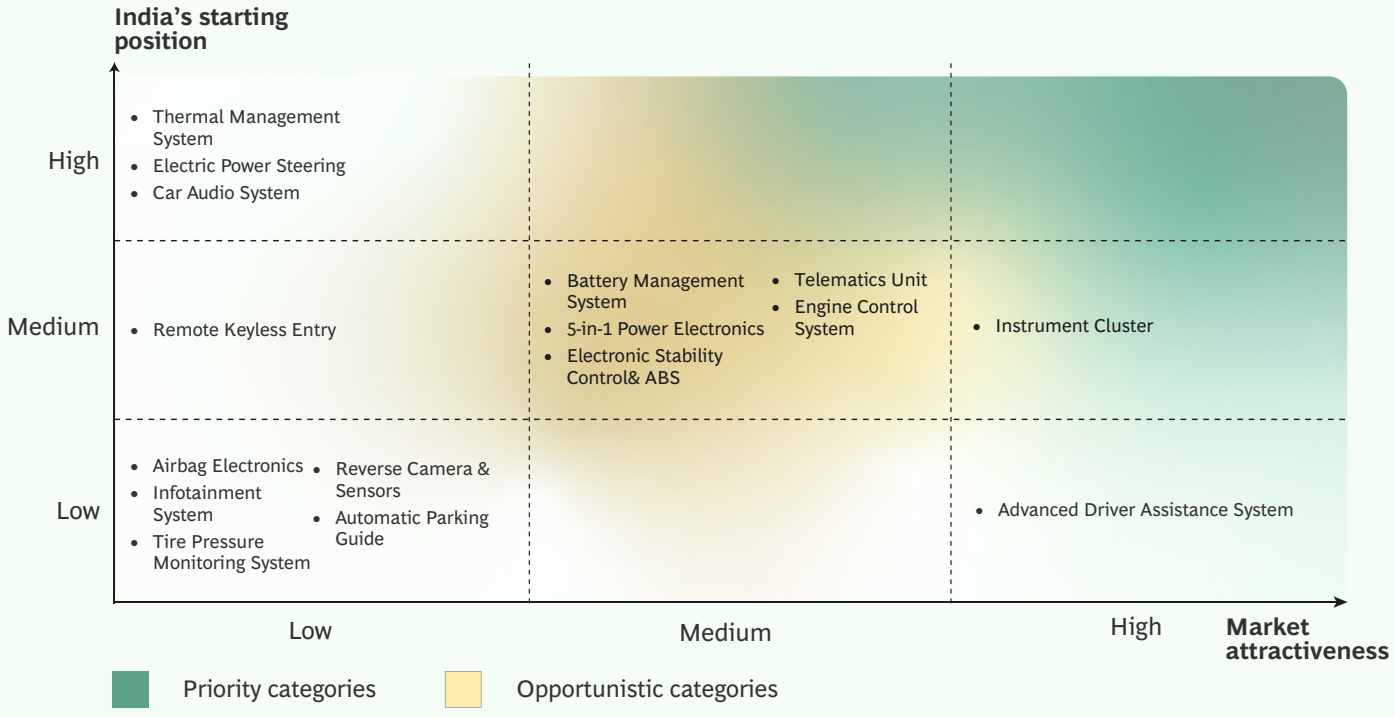
India's EV penetration has grown rapidly, with 2W EV adoption increasing from 0.1% of total units sold in FY20 to 6% in FY24. Correspondingly, 3W EV penetration has surged from 18% to 55% in 2024. This expansion, coupled with various government policies and schemes focused on localizing the electronics value chain, presents a transformative opportunity for the sector in India.

A crucial factor in strengthening India's role in EV exports is the localization of key electric and electronic components. Domestic component majors are increasingly involved in developing and assembling critical EV subsystems such as the 5-in-1 Control Box, ABS, and thermal management system. This shift towards localized production aims to reduce dependence on imports and enhance India's supplier credentials in global markets.

Additionally, strategic partnerships and technology collaborations with global tier-1s are boosting India's expertise in electronics and advanced automotive systems (e.g., leading Indian Auto Comp majors partnering for e-powertrain and power electronic components). These alliances combine global technological expertise with India's manufacturing strengths, further strengthening the country's export potential. Morover, the country's EV ecosystem is thriving with numerous startups nurtured by multiple incubators, venture capatalists (VCs) and private equity (PE) firms, driving innovation in the sector.

In addition to EV components, the third pillar of growth lies in expanding India's electronics manufacturing prowess in the auto industry with a focus on components with strong global demand and low production complexity. Both sectors combined, India can further add $15-20 Bn to its auto exports.

Given the increasing global demand for electric and electronic components and India's evolving manufacturing landscape, we have identified six key component systems (Exhibit 14) with high export potential. These components have been prioritized based on global market attractiveness (global market size and future growth) and India's existing supplier ecosystem (presence of local manufacturing or assembly, foreign subsidiaries in India, or Tech JVs with Indian Tier-1s).



1. Market Attractiveness is determined by indicative global market size (2023) and growth potential in the future
2. India's starting position is based on the current supplier ecosystem in India (presence of Indian Manufacturing/Assembling Companies, Subsidiary of Tier-1 in India, and Tech JV of an Indian Company with Tier-1/OEM) and current level of supply chain localization in India

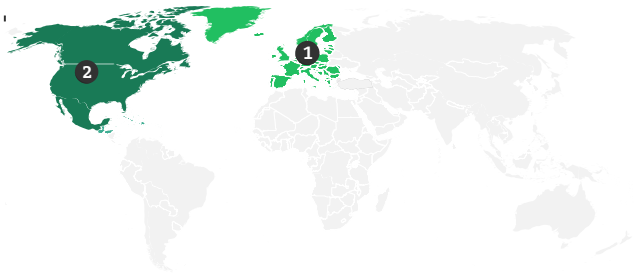
Industry imperatives to unlock auto components export potential

Priority markets and components as we look to accelerate exports

The global auto component trade currently stands at $1.2 Tn, growing at a 2% CAGR over FY19-24. India's auto component exports are at $21 Bn, growing at ~8% CAGR, indicating strong momentum and substantial headroom for expansion—both at a national level and for each Indian component player.

This opportunity is disproportionately anchored to two key geographies—North America and Europe—spans both classic vehicle components and emerging EV and electronic components. North America and Europe collectively account for ~73% of the global auto component trade. Additionally, for classical components, given the large size of the existing global trade and the relatively lower investment focus by global majors, India has a strong potential to expand exports—from the current $20 Bn, with an additional $40-60 Bn in potential growth. For EV and electronic components, an opportunity exists for Indian Auto Comp players to build on the emerging electronics value chain in India and build in-house capabilities through technology tie-ups and partnerships.

To capitalize on this potential and steer towards the $100 Bn auto comp exports aspiration, major Indian players will need to scale their export footprint by 5-10X with a deeper penetration into global supply chains.



2 Target geographies presenting 73% of global Auto-Comp trade

1 Europe
- $151 Bn imports in 2023; second highest after North America
- Imports growing from both China (at 8% 5Y-CAGR) and India (at 7% 5Y-CAGR)

2 North America
- $170 Bn imports in 2023; highest among all regions
- China imports stagnant with tariff war, opportunity for India

Target components across Classic and EV

Classic Components

- Axles
- Engines
- Fasteners
- Gears
- Rubber
- Motors
- Wiring Harness
- Brakes and components
- Engine components
- Suspension
- Gearbox and parts

EV & Electronic Components

- Battery Management System
- 5-in-1 Power Electronics
- ABS
- Telematics Unit
- Electric Power Steering
- Engine Control System
- Instrument Cluster
- ADAS
- Thermal Management Systems

12 point action plan for Indian Suppliers to accelerate exports

Enhance Engg. & NPD muscle

1. Scale up engineering & prototyping capabilities
   Modernize toolrooms; expand engineering & prototyping capabilities for faster development cycles
2. Expand towards vehicle system-level expertise
   Upgrade from component-level manufacturing to integrated sub-assemblies & full-system solutions

Digitize the Core

3. Embrace Automation & Industry 4.0
   Leverage declining compute costs and India's software advantage, drive select digital and process automation
4. Integrate AI-driven quality control, predictive maintenance, and smart automation for manufacturing excellence
5. Strengthen Supply Chain Visibility

Accelerate Innovation Focus

6. Accelerate technology transfers / tie-ups
   Forge strategic alliances for next-gen products, particularly in EV & electronic components
7. Drive R&D with academia & startups
   Invest in joint R&D programs to fast-track indigenous technology commercialization

Expand Global Footprint

8. Strengthen presence in key geographies
   Targeted expansion of warehousing and/or finishing plants near global OEM hubs to boost supply chain reliability
9. Scale up global on-ground teams
   Bolster engineering, sales, and support teams for greater collaboration & engagement with OEM/Tier 1s

Lead in ESG & Sustainability

10. Establish ESG Baseline
    Track and audit starting point on ESG, aligned with global OEM requirements
11. Drive & monetize sustainability efforts
    Deploy targeted measures (e.g., renewable energy)
12. Capitalize on carbon credits, ESG-linked financing, and global regulatory incentives

04

Gearing up for global success:

Key enablers to drive auto component exports

A well-defined set of **strategic interventions** would be paramount to enhance India's position as a global automotive supply hub. We propose three key interventions to set the Auto Comp industry on an accelerated path towards $100 Bn exports aspiration. These levers will help Indian Auto Comp players integrate more deeply into global value chains, laying the foundation for long-term growth.

$100 Bn
Indian Auto Comp Exports aspiration

A. Position India as a Global Automotive Hub

Attract global OEM & Tier 1

- Structured and targeted outreach, understanding their requirement, shaping India offering and leveraging state incentives already in place
- Single window clearance to streamline approvals

Unlock access for Indian Auto Comp

- Expand presence closer to customers including shared warehousing facilities
- Aggregator exports business model to simplify buying for global OEMs and aftermarket companies

B. Enhance Testing & Tooling with Scale Unlock

Expand testing and validation ecosystem

- Enhance capacity in testing and validation centers in each auto cluster
- Leverage automation and digital/AI driven quality systems

Build world-class tooling infrastructure

- Democratize through shared toolroom in each auto cluster (e.g., toolroom-as-a-service model)

Reskill and train on new-age auto tech

- Expand/establish auto-focused reskilling centers in each cluster
- Industry-led curriculum development, explore sponsorship of ITIs

C. Advance Design & Innovation Capabilities, & Embed Sustainability

R&D investment for local capability build

- Accelerate tech transfers & partnerships, with supporting policy framework

Tech Parks for global engineering collaborations

- Build Auto focused tech parks with embedded R&D capabilities; incentivize OEMs to relocate ER&D to India
- Foster collaboration among OEMs, Auto Comps, Academia & startups through Automotive & Manufacturing Innovation ecosystem

Drive readiness towards ESG and sustainability

- Industry-wide framework to track ESG
- Collaborative effort in each auto cluster to improve across ESG dimensions (e.g., pooled renewable energy investments)

A. Position India as a Global Automotive Hub:

Currently, the Indian Auto Comp sector stands at $74 Bn with $20 Bn of exports. In contrast, China's auto component sector is estimated at $779 Bn with $149 Bn in exports.

This scale differential is driven by the relative size of local vehicle production in each geography and its role in OEMs' global supply chain footprint.

India's passenger and commercial vehicle production currently stands at 5.3 Mn units annually, with exports accounting for ~0.75 Mn. In contrast, China produces 28 Mn units annually, with a significantly higher export at ~5 Mn.

Accelerating growth of India's component exports will require greater engagement from global OEMs and Tier-1's: across both vehicle/component manufacturing in India for global markets, and sourcing components from India for their global facilities.

Of the top 50 global auto Tier-1s, less than half have local manufacturing presence in India currently. With global supply chains being reshaped by emerging trade regulations, global OEMs and Tier-1s are increasingly re-evaluating India's position in their global footprint.

> **"Our goal is to considerably grow our global sourcing volume from India. We have an ambitious target of scaling our existing spend of approximately €500 Mn to €2 Bn by 2030. We are quite optimistic that we will surpass this target"**
>
> —Senior VP, Leading Tier-1 CPO

While there are early signs of global automotive players expanding and re-evaluating their India footprint, concerted efforts are needed both to attract global OEM and Tier-1 investments into India and to unlock global market access for Indian Auto Comp players.

A.1. Attracting global OEM and Tier-1 investments into India:

To further India's trajectory towards solidifying its position in the global automotive manufacturing canvas, structured efforts are required to attract leading OEMs and Tier-1 suppliers.

Proactive outreach to global auto OEMs and Tier-1s will play a crucial role in shaping their long term India strategy. This outreach will require joint orchestration by industry bodies (ACMA, SIAM), support from Invest India at a national level and participation by respective Investment Promotion Agencies of different states. Understanding the specific requirements of these anchor OEMs and component players through a direct dialogue and engagement with their global decision-makers will help India craft a tailored offering and attract them to invest / migrate their production and sourcing to India. This tailored offering can include a combination of capital subsidy incentive packages for anchor OEMs and extending similar "cluster incentives" to a cluster of Tier-1s and Tier 2s supporting their manufacturing, and fast-tracking approvals across central, state and local governments, through a dedicated government facilitation channel.

While multiple state-level incentives (such as capital subsidies of up to 20%, state level PLIs, exemption on power and electricity) are already in place across multiple Indian states (such Gujarat, Rajasthan, Telangana, Karnataka and Tamil Nadu), a coordinated central-state incentive framework can be conceptualized for attracting this investment, similar to the subsidies offered to attract Semiconductor FAB investment. Further, beyond individual OEMs and Component players, a "cluster-based incentive" package should be planned, where the anchor OEMs and their respective Tier-1 and Tier-2 supplier ecosystem are collectively incentivized if they apply as a cluster. These incentives can be linked to various targets for indigenization, technology transfers, and exports from India (in vehicles and/or components), thus ensuring deeper penetration of Indian Auto Comp into their global supply chain.

A dedicated hotline enabled by Central Government agencies (e.g., by Invest India) will be crucial in streamlining the investment process – from initiating the dialogue to facilitating tailored offering creation. Further, implementing a single-window clearance system will simplify administrative and approval processes for global players, enhancing coordination across central, state, and local authorities. Such measures will boost investor confidence by offering regulatory clarity, expediting capacity addition, and relocation for both new entrants and incumbents.

A.2. Unlocking global access for Indian Auto Comp:

Indian auto component players have been making strides in expanding their global footprint, with leading exporters setting up physical warehousing and/or factories, and regional teams (including R&D / engineering centers) in key export destinations.

However, setting up multiple warehouses and independent engineering, service, and sales offices across multiple target geographies can be cost prohibitive for many Indian Auto Comps, particularly for newcomers. A shared industry-led model can provide a stepping-stone, unlocking global access and providing capabilities that would otherwise require scale.

Establishment of shared warehousing facilities located in key strategic geographies (e.g., across Germany, Eastern Europe, USA, Latin America, Southern Europe) can support Auto Comp players in addressing shipping reliability. Setting up such facilities will require initial facilitation by ACMA along with an Indian government agency in these target markets and collaboration with logistics providers. These shared facilities can further help smoothen global access for Indian Auto Comps and enable seamless availability of parts/spares to global OEMs.

> **"Indian suppliers should invest in setting up engineering collaboration teams in Europe and the US to strengthen engagement with OEMs and accelerate co-development efforts"**
>
> —CPO, Leading PV OEM

> **"We prefer suppliers with 24/7 support teams locally to better meet engineering needs, ensuring timely services."**
>
> —CPO, Leading CV OEM

Additionally, an aggregator play for exports can present a significant opportunity for incumbents. These demand aggregators collocated with global automotive hubs (closer to OEM R&D teams) will have design and engineering capabilities, thus engaging with both the R&D teams of OEMs and with Indian auto-comp suppliers – thereby, bridging any gaps in engineering collaboration and enabling faster development turnaround times.

The aggregator can act as a conduit for facilitating new connections—identifying new Indian suppliers for global OEMs by understanding their requirements and matching them with a suitable Indian supplier based on their capabilities and capacity—ultimately supporting Indian Auto Comps with deep integration into OEM supply chains. Ensuring the success of this effort would require an active

lead from industry bodies such as ACMA and partnerships from IPOs of global OEMs and Tier-1s in India.

ACMA could also spearhead the development of a comprehensive online platform, showcasing the capabilities of Indian Auto Comp players (e.g., similar to platforms like 'Trade India', 'Exporters India', for instance). This platform can feature detailed profiles of suppliers, product offerings, tech competencies, existing partnerships, ESG footprints, etc., and can be made accessible to global OEMs and Tier-1 suppliers. Such a centralized repository would provide global OEMs with easy access to vetted suppliers, thereby enhancing collaboration opportunities.

Through a combination of these actions, India can continue to expand its role in the global automotive ecosystem. Sustained efforts in these areas can help drive increased participation from global OEMs and embedding of Indian Auto Comp in their global supply chain.

B. Enhance Testing and Tooling Capabilities through Scale Unlock

With 80% of CPOs across global OEMs and Tier-1s open to sourcing from India, the industry is already witnessing strong momentum. However, there is consistent feedback from many CPOs about the opportunity for India to improve its tooling and testing capabilities to meet global standards.

> **"Enhancing tooling capabilities and process automation will enable Indian suppliers to reduce development lead times, increase yield, and improve product reliability; boosting competitiveness with regional manufacturers."**
>
> —CPO, Leading PV OEM

> **"Indian suppliers possess robust Build-to-Print capabilities; elevating India's in-house design and engineering capabilities will make them a highly desired destination for OEMs for co-developed and FSS components."**
>
> —CPO, Leading PV OEM

A cluster-level capability build across the three vectors of testing, tooling, and skilling can provide the foundational building blocks for Indian Auto Comps on their journey towards improving quality and reducing time to commercialization and scale. With this, smaller players can collectively attain pseudo scale for testing and tooling capabilities.

Following are some key initiatives in this direction:

B.1. Establishing an Advanced Testing and Validation Ecosystem

As India scales its auto component exports, the need for state-of-the-art testing and validation facilities has become paramount. Enhancing capacity and capability of testing and validation centers in each auto cluster will help accelerate product validation, reduce development and commercialization timelines, and enhance India's quality competitiveness.

Establishing and scaling up advanced testing and validation centers in a Public-Private-Partnership (PPP) model can help bridge this gap in testing infrastructure. The government can contribute to these PPP SPVs by providing Viability Gap Funding (VGF) or land and / or buildings, free or as equity, while private players from the automotive industry can drive investment in testing and certification equipment and manage the operation of these centers to ensure high operational efficiency and effectiveness. These can be further equipped with automated testing and Digital / AI-driven quality systems, in line with emerging requirements from global OEMs, to reduce human errors emanating from manual testing processes. Such testing hubs will help democratize access to world-class testing and validation facilities for Indian tier-1 and 2 Auto Comp players.

A relevant model to draw inspiration from is Indian National Space Promotion and Authorization Center (IN-SPACe), under the Department of Space, which plays a pivotal role in facilitating private sector participation in India's space industry. To accelerate innovation, the government recently launched ₹500 crore Technology Adoption Fund to boost space startups by supporting R&D, testing, and validation infrastructure. A similar fund for the auto components sector could help accelerate the establishment of advanced testing hubs across key auto clusters. These hubs would cater to suppliers across the industry, enabling faster product validation, higher quality compliance, and agile development and commercial cycles.

B.2. Building World Class Tooling Infrastructure:

Today, the majority of tooling in the Indian Auto Comp industry is imported from global suppliers with deep sectoral experience—which provide high quality at competitive costs due to high repeatability and expertise. India's in-house toolroom capacity remains limited, with only some large and mid-sized players operating in-house toolrooms. On the other hand, the majority of commercial toolrooms in India are sub-scale, lack sectoral focus, and therefore, expertise.

Establishing world-class tooling facilities with dedicated focus on Auto in each cluster will be a critical capability unlock in India's global export ambition. This effort can be kick-started by upgrading and expanding existing in-house toolrooms within large auto players.

Driving scale efficiency, advanced expertise building, and profitability among these auto-focused toolrooms will require rethinking their operating model. Spinning them off into shared facilities with a Toolroom-as-a-Service (TaaS) model can be one potential solution. This model can democratize access to high-end tooling infrastructure for Tier-1 and 2 suppliers (e.g., on a pay-per-use basis) while ensuring improved utilization and additional revenue stream for toolroom operators.

To enable such a kind of shared model and drive cluster-specific capability building, industry bodies such as ACMA can play an anchor role by facilitating discussions with toolroom owners, charting out a modernization roadmap, mapping the need for toolroom capacity and capability by cluster, and developing a standard cost sharing/access model in collaboration with industry members. The government can support this initiative with appropriate policies and fiscal incentives, to facilitate the modernization and spin-off of such in-house toolrooms.

B.3. Reskilling and Training on New-Age Auto Tech:

India's auto component industry is transitioning towards building highly specialized manufacturing set-up across auto electronics, electric mobility and digitalized production lines. A highly skilled workforce trained in these new-age technologies is essential to drive this transformation.

To meet the growing demand for specialized talent in auto manufacturing, dedicated auto-focused reskilling centers should be expanded/established across each cluster. These centers should focus on high-demand skill areas such as:

- **Mechatronics**—Automation, robotics, and sensor integration for modern vehicle production
- **Auto Electricals and Electronics**—Addressing the increasing role of electrification and electronic automotive systems
- **Tooling Engineering**—Developing expertise in toolroom design, operations, and die-making to scale India's tooling infrastructure

This program architecture and reskilling agenda can be collaboratively designed with global and Indian auto OEMs and Tier-1s. The government can also explore industry sponsorship of Industrial Training Institutes (ITIs) closer to auto clusters as a key enabler in upskilling the upcoming talent pipeline. These OEMs and Tier-1s, in collaboration with ACMA and National Skill Development Corporation (NSDC), can assist in modernizing ITI infrastructure and updating/developing its curriculum by introducing courses (e.g., on Automation, Digital and Industry 4.0). Additionally, OEMs and Tier-1s can also benefit from a direct hiring pipeline from trained talent with specialization in their priority domains.

Driving implementation for these initiatives will require an industry-driven structured roadmap across testing, tooling and skilling at a cluster level (across key auto clusters in Tamil Nadu, Haryana, Gujarat, Maharashtra, and Karnataka).

Alongside these foundational capabilities, the integration of targeted digitalization and automation interventions across current manufacturing processes will also be critical to enhancing quality, efficiency, and reliability. This will help in a structured transition towards Industry 4.0-driven smart manufacturing, which will position Indian suppliers as trusted partners for global OEMs.

Industry associations such as ACMA and SIAM, in collaboration with government stakeholders (including appropriate fiscal incentive), can play a pivotal role in realizing this roadmap and driving targeted investments in key clusters.

Additionally, the industry can benefit from the establishment of a unified Bharat Quality Standard, aligned with global benchmarks. This is an ambitious initiative and driving/enforcing the adoption of this standard among auto OEMs operating in India will require close collaboration with Indian OEMs, global OEMs present in India and orchestration by bodies like ACMA, SIAM and Govt. agencies. However, success on the initiative can help Auto Comp players fast-track their global quality certification processes and compete more effectively in international markets.

A similar example of this is the GreenCo certification in the Indian renewable energy sector, which has gained global recognition for sustainable practices. A similar industry-led standard and certification for auto components can strengthen India's positioning in global auto component markets. A critical moot point would be to drive and enforce the adoption of this standard among Indian and global auto OEMs and component players, which would require a joint effort between government agencies and industry bodies.

C. Advance Design & Innovation Capabilities, & Embed Sustainability

With rapid electrification and electronification in vehicle architectures, it is critical for the Indian component industry to invest in technology development and innovation. By leveraging India's global leadership in software and the emerging electronics value chain, India can establish itself as a global hub for automotive innovations over the next decade.

> **"Indian auto ecosystem can accelerate with deeper R&D investments towards shaping future automotive innovations"**
>
> —CPO, Leading CV OEM

Fostering this innovation culture and building indigenous technology will require action across three vectors:

C.1. Tech Parks for Global Engineering Collaborations

India has established itself as a global hub for technology and services through Global Capability Centers (GCCs), with over 1,600 centers (of which 45% are located outside their home market).

However, today, the role of the GCCs in the fundamental vehicle development cycle remains relatively muted. The bulk of ER&D initiatives are spearheaded by global Tier-1s and OEMs in their global R&D centers, with Indian GCCs primarily handling ad-hoc projects and localized design customizations.

India contributes over 30% to the global STEM talent pool, offering a high-quality, cost-effective workforce. However, this talent potential remains relatively underutilized by global auto-focused GCCs. The development of auto-focused tech park with embedded R&D facilities can help in grooming and attracting the right talent pool for auto ER&D; and can provide a one-stop solution for both Indian and global auto ecosystem in relocating their ER&D efforts.

Government enabled outreach and incentives to global OEMs can accelerate the relocation of their R&D and engineering operations to India. Fostering cross-pollination of capabilities across the Indian auto ecosystem - benefiting Indian Auto Comp suppliers. This will significantly enhance and shape India's indigenous auto technology and R&D capabilities.

India can establish **an Automotive and Manufacturing Innovation Ecosystem** in key auto clusters, connecting relevant stakeholders - across auto component manufacturers, global and Indian OEMs, top academia (including IITs, NITs), and auto focused startups to drive collaborative development of indigenous technology.

This initiative can be designed and orchestrated by industry bodies (such as ACMA, SIAM, and IPO forums) with investment support from the government. This model can drive new IP creation for component players, funding access to start-ups and customized design adaptations/ solutions for OEMs in the local market. Auto Comp players can leverage these capabilities to advance technologically, gradually expanding their scope of supply from Build-to-Print (BTP) and Co-developed towards Full-Service Supplier (FSS) model.

Driving success of this effort will require defining a comprehensive, industry-aligned "Technology and Research Roadmap" focusing on critical areas where India currently lags, while bringing together the right stakeholders across these domains. For a seamless 'industry-academia partnership', the ecosystem should be located within the vicinity of top institutions, such as IITs and NITs, to attract highly skilled researchers in the ecosystem. Further, this requires a structured funding program - combining funding allocations from industry and government, and deploying towards priority topics in start-ups and academia. Lastly, it is critical to establish measurable success metrics such as patents filed and commercialization timelines to track impact and drive accountability.

Exhibit 20 - Manufacturing Innovation Ecosystem

Innovation ecosystem and stakeholder contributions

Auto Comp Manufacturers
- Drive localized R&D to develop new technologies
- Adopt next-gen manufacturing processes

Academia
- Establish joint research centers with OEMs/Tier-1s
- Share capacity of research centers with smaller Auto Comp players

Government
- Provide regulatory assistance/ enhancements
- Facilitate funding support and tax incentives

Indian and Global Auto OEMS
- Offer real-world insights to align R&D with industry needs
- Provide platforms for prototyping and testing

Industry bodies *(ACMA, SIAM, etc.)*
- Conduct trainings and workshops
- Build awareness/outreach support

Startups
- Create IP through both product design and processes
- Pilot innovative solutions with manufacturers and academia players

C.2. Boosting R&D focus and investments

Indian players have commenced activities across the electronics and semiconductor value chain, with many component players and startups participating in design-fabrication-assembly-testing-module/PCB assembly value chain. However, most efforts are restricted to electronics manufacturing services, with module level IP still largely held by global Tier-1 companies.

There is a critical need for increased R&D investment by Auto Comp players to enhance design and supply chain control. Targeted government fiscal support in auto electronics, xEV powertrain, and software-driven vehicles could drive this strategic shift.

A targeted outreach to global OEMs can accelerate the relocation of their R&D and engineering operations to India. A 'booster incentive' program can be considered by the government, wherein global OEMs establishing / migrating their R&D facilities to India, and subsequently setting up a manufacturing unit, can receive additional incentives - and vice versa. This will not only strengthen India's role in global auto innovation and production, but also foster crosspollination of capabilities across the Indian auto ecosystem.

Technology transfers and partnerships are crucial for building local capabilities within India. A standardized policy framework with mandates for exports by local entities, potentially coupled with a diminishing royalty model, will significantly aid Indian players and set the right foundation for these partnerships.

C.3. Industry Readiness towards ESG and Sustainability

Several global OEMs have clearly established their ESG goals, with these targets progressively trickling down to their suppliers. Implementing an industry-wide framework for Indian Auto Comp players to track their ESG starting points will facilitate their participation in the global demand pool with increasing ESG requirements. Industry associations such as ACMA can help define this framework and drive its awareness and adoption across member companies.

Mid-sized and smaller suppliers often find it challenging to individually enhance their ESG footprint due to scale limitations. A collaborative effort in each auto cluster to improve across ESG dimensions could provide crucial support. This approach has been successfully implemented in sectors like textiles for instance, where pooled renewable energy investments (in solar and wind power projects) enable small manufacturers to reduce energy costs and carbon footprints. Additionally, setting up shared water treatment facilities can optimize water reuse and reduce wastewater discharge. The pharma and chemical industries have already adopted common effluent treatment plants to manage industrial waste more effectively. OEM-driven carbon credit programs can further incentivize suppliers to transition to green energy, aligning them with the global sustainability benchmarks. A structured roadmap for carbon certification in auto manufacturing will enhance the competitiveness of Indian suppliers in global markets.

To enhance these initiatives, ACMA can serve as a key catalyst by elevating awareness and initiating the ESG journey for its members. By orchestrating initiatives and fostering dialogues among OEMs, Tier-1s, and Auto Comp players, ACMA can effectively narrow the gap between existing practices and forthcoming sustainability demands.

Conclusion

India's auto component sector is at an important turning point, driven by increased localization and supported by strong government policies. These efforts have helped reduce imports in key areas while boosting exports at a rapid pace. More local companies are now supplying to global OEMs and Tier-1s, strengthening India's role in the global supply chain.

At the same time, the industry is seeing major changes with the rise of EVs, lightweight materials, and new technologies. India is making strong progress in these areas while also maintaining a competitive edge in classic components.

With a strong foundation in place, India can accelerate exports by strengthening industry collaboration, enhancing technology adoption, and leveraging continued government support. An orchestrated move forward will not only solidify India's position as a leading exporter of auto components but also help the country achieve its ambitious export target of $100 Bn.

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For further contact

If you would like to discuss this report, please contact the authors.

Appendix

Values in $Bn

Exports			Top Components	Imports		
Other Industries	Auto	Overall		Auto	Overall	Other Industries
Home appliances, Aviation, Power Gen.	1.9	2.3	Engine Components	1.9	2.9	Home appliances, Power Generation
Renewable energy, Aviation	0.3	1.3	Motors	0.3	1.0	Home appliances, Renewable Energy
Renewable Energy	0.7	1.2	Gears	0.3	1.0	Renewable Energy
-	0.8	0.8	Brakes and components	0.3	0.3	-
Oil & Gas	0.5	0.8	Body & Structure	0.2	0.3	Oil & Gas, Aviation
-	0.7	0.7	Gearbox/ Gearbox Parts	1.5	1.5	-
-	0.7	0.7	Axles	0.3	0.3	-
-	0.4	0.7	Fasteners	0.5	0.8	Home appliances, Construction, Solar
Power Generation	0.5	0.6	Engines	0.5	0.5	Power Generation
Power Generation	0.4	0.4	Shafts	0.2	0.3	Renewable Energy, Power Generation
Aviation	0.3	0.3	Wiring harness	0.1	0.1	Aviation
-	0.3	0.3	Steering Parts	0.2	0.2	-
-	0.2	0.2	Wheels/ Rims	0.1	0.1	-
-	0.2	0.2	Suspension	0.2	0.2	-
-	0.2	0.2	Lightings	0.4	0.4	-
Mining, Textile Machinery	0.2	0.2	Rubber	0.1	0.2	Home appliances, Renewable Energy
-	0.1	0.1	Clutches	0.2	0.2	-
-	0.1	0.1	Airbags	0.2	0.2	-
Metrology	0.0	0.1	Instrument cluster & Sensors	0.1	0.3	Metrology
-	5.6	6.9	Others	4.8	5.8	-
-	2.4	3.1	Others (Not analyzed)	3.3	4.4	-
-	**16.5**	**21.2**	**Overall**	**15.7**	**20.9**	-

Source: ACMA; Volza trade data; BCG analysis
Note: This table categorizes various components into exports and imports across the automotive and other industries. The 'Auto' column under each category specifies the trade value specifically for the automotive industry, while 'Overall' includes trade from all industries. For components where there is a significant trade gap between the overall and auto figures, the table also lists other key industries involved in the trade of that component

Methodology: To isolate the auto-specific trade balance, we started with 219 HS codes representing all auto component trade. Then we refined the list to 170 codes directly relevant to the auto industry. From this, the top 56 HS codes accounting for 80%+ of trade volumes were analyzed on a company level to determine their automotive trade relevance. This relevance was then overlayed on exports and import figures for each component separately


BCG + ACMA