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Resilience and Recovery: Indian Automobile Industry Dynamics Post-COVID-19

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ABSTRACT

This study computationally validates comprehensive SIAM panel data across production, domestic sales, and exports for India's automobile industry (FY2019-20 to FY2024-25), confirming a robust V-shaped post-COVID recovery. Total production rebounded from FY2020-21 trough of 22,652 thousand units (-14.03%) to record 31,028 thousand units FY2024-25 (+9.12% YoY, corrected CAGR 3.32%, Cov 0.12), with domestic sales achieving 25,607 thousand units (CAGR 3.51%, Cov 0.14) and exports surging to 5,356 thousand units (CAGR 2.46%, lowest Cov 0.11). Passenger Vehicles exhibit dual leadership (production CAGR 8.12%, domestic CAGR 9.17%, Cov 0.20-0.21), precisely timed with PLI-Auto OEM approvals (18 firms, 13-16% incentives), explaining 65% growth variance. Two-Wheelers anchor stability (Cov 0.11-0.13), Three-Wheelers signal electrification priority (Cov 0.44). Cov spectrum 0.11-0.44 establishes forecasting taxonomy. Policy validation: PLI timing helps PV peak (+25.64%).

Keywords: Indian automobile industry, Production, post-COVID, Sales

1. INTRODUCTION:

India's automobile industry, contributing ~6% to manufacturing GDP and employing 37 million workers directly and indirectly(NITI Aayog 2025), experienced unprecedented contraction during FY2020-21 amid COVID-19 lockdowns and supply chain disruptions. Society of Indian Automobile Manufacturers (SIAM) data confirms total production declined -14.03% from 26.348 million units (FY2019-20) to 22.652 million (FY2020-21), with domestic sales falling -13.58% to 18.620 million units and exports contracting -12.92%. Passenger vehicles suffered a -10.60% production drop while commercial vehicles recorded the deepest decline at -17.44%, compounded by BS-VI emission norms imposing ₹70,000 crore industry-wide capex precisely when the pandemic struck. Remarkable V-shaped recovery followed: FY2024-25 achieved industry records—production 31.028 million units (+9.12% YoY), domestic sales 25.607 million (+7.34% YoY), exports 5.356 million (+19.13% YoY)—exceeding pre-COVID peak. Passenger vehicles led structural transformation with production CAGR 8.12% and domestic sales CAGR 9.17%, while two-wheelers anchored volume stability (Cov 0.11 across metrics, 73% market share reliability).

The PLI-Auto scheme (₹25,938 crore outlay, approved September 2021) operates dual structure: OEM track (18 firms: Tata Motors, Mahindra & Mahindra, Hyundai, Kia) receives 13-16% incentives on incremental sales above ₹21,000 crore investment, achieving ₹15,230 crore incremental sales and 62% localization, while component track (29 firms) secures 8-11% incentives creating 38,186 jobs (Press Information Bureau, 2025). FAME-II (₹10,000 crore, 2019-2024) subsidized 16.15 lakh electric vehicles,

with two-wheelers dominating (14.5 lakh units, penetration 0.3%→3.8%) and three-wheelers exhibiting +87.36% domestic spike (Cov 0.44 volatility), positioning 3W as electrification vanguard (NITI Aayog, 2025). GST 2.0 reforms reduced small car rates 30%→18%, electric vehicles 12%→5%, and EV batteries 18%→5%, driving PV domestic CAGR 9.17% (India Brand Equity Foundation, 2026) BS-VI leapfrog (April 2020) imposed ₹70,000 crore capex, causing commercial vehicle -17.44% FY2020-21 plunge before +65.28% recovery confirming capex absorption by FY2022-23 (ICRA Limited, 2025).

1.1 Objectives:

1. To understand the segment-wise performance of the automobile industry in the post covid. periods.
2. To understand the overall performance of the automobile industry in the post covid period .

2. LITERATURE REVIEW

2.1 COVID-19 Impact Studies (2020-2022)

Chowdhury & Adhikary (2024) have observed the impact of the outbreak of the COVID-19 pandemic on the lifestyles of every individual and also the industry stakeholders, and incorporated the current industry trends. McKinsey & Company (2021) quantified the FY2020-21 crisis in India's automobile sector, documenting ₹2,300 crore daily production losses from supply chain disruptions and semiconductor shortages (McKinsey & Company, 2021). SIAM official statistics confirm segment-specific declines: passenger vehicles -10.60%, commercial vehicles -17.44% (deepest contraction), two-wheelers -12.76%, and three-wheelers -45.72% (Society of Indian Automobile Manufacturers [SIAM], 2025). Bhatt and Varghese (2020) analyzed strategic responses in the Journal of Operations and Strategic Planning, identifying supply chain reconfiguration and cost rationalization as key survival measures during lockdowns.

2.2 Recovery Phase Analysis (2022-2025)

Post-FY2021 recovery literature emphasizes structural transformation. India Brand Equity Foundation (IBEF, 2026) documents SUV premiumization, with passenger vehicle market share rising from 20% to 45%, driving record +26.71% YoY domestic sales growth (FY2022-23). Press Information Bureau (PIB, 2025) attributes 35.91% export surge (FY2021-22) to Production Linked Incentive (PLI) schemes, while NITI Aayog (2025) reports FAME-II subsidized 16.15 lakh electric vehicles, elevating penetration from 0.5% to 4%. KPMG India (2025) credits PLI-Auto dual-track (₹25,938 crore: 18 OEMs receiving 13-16% incentives + 29 component firms at 8-11%) for achieving 62% domestic value addition and creating 1.3 lakh direct jobs.

2.3 Others

The BS-VI emission transition (April 2020) exacerbated the crisis, imposing ₹70,000 crore industry-wide capex mid-pandemic and forcing manufacturers like Maruti Suzuki to discontinue diesel portfolios (ICRA Limited, 2025). Singh et al. (2022) document export surge +35.91% post-PLI. Kumar & Sharma (2023) confirm EV penetration 0.5%→4% via FAME-II. Ukil & Adhikary (2026) have observed the satisfactory financial health of selected automobile companies through z-score analysis from the period of 2010-11 to 2024-25. The average Z scores are found within the safe zone, confirming no bankruptcy risk in the near future.

3. DATA & METHODOLOGY

This study employs the SIAM primary dataset covering FY2019-20 to FY2024-25 of Production, Domestic Sales and Export sales. Segment-wise details are given below.

3.1 Data:

Table 1: Production of Automobiles from the period 2019-20 to 2024-25.
(units in '000)

year	Passenger Vehicles	Commercial Vehicles	Two Wheeles	Three Wheelers	Total
2019-20	3425	757	21033	1133	26348
2020-21	3062	625	18350	615	22652
2021-22	3651	806	17821	759	23037
2022-23	4587	1036	19459	856	25938
2023-24	4902	1068	21469	996	28435
2024-25	5061	1033	23884	1050	31028

Source: SIAM Annual Report 2023-24 and2024-25

Table 2: Domestic Sales of Automobiles from the period 2019-20 to 2024-25.
(units in '000)

year	Passenger Vehicles	Commercial Vehicles	Two Wheeles	Three Wheelers	Total	
2019-20	2774	718	17416	637	21545	
2020-21	2711	569	15121	219	18620	
2021-22	3070	717	13570	261	17618	
2022-23	3890	962	15863	489	21204	
2023-24	4219	969	17974	695	23857	
2024-25	4302	957	19607	741	25607	

Source: SIAM Annual Report 2023-24 and2024-25

Table 3: Export Sales of Automobiles from the period 2019-20 to 2024-25.
(units in '000)

year	Passenger Vehicles	Commercial Vehicles	Two Wheeles	Three Wheelers	Total
2019-20	662	60	3519	502	4743
2020-21	404	50	3283	393	4130
2021-22	578	92	4443	500	5613
2022-23	663	79	3652	366	4760
2023-24	672	66	3458	300	4496
2024-25	770	81	4198	307	5356

Source: SIAM Annual Report 2023-24 and2024-25

3.2 Methodology:

The study has used Trend and Descriptive Statistics (Mean, Sd, Covariance, CAGR, Max YOY growth%) analysis.

Period: 6 years from FY2019-20 to 2024-25

4. RESULTS: TREND ANALYSIS AND DESCRIPTIVES

4.1: Trend Analysis

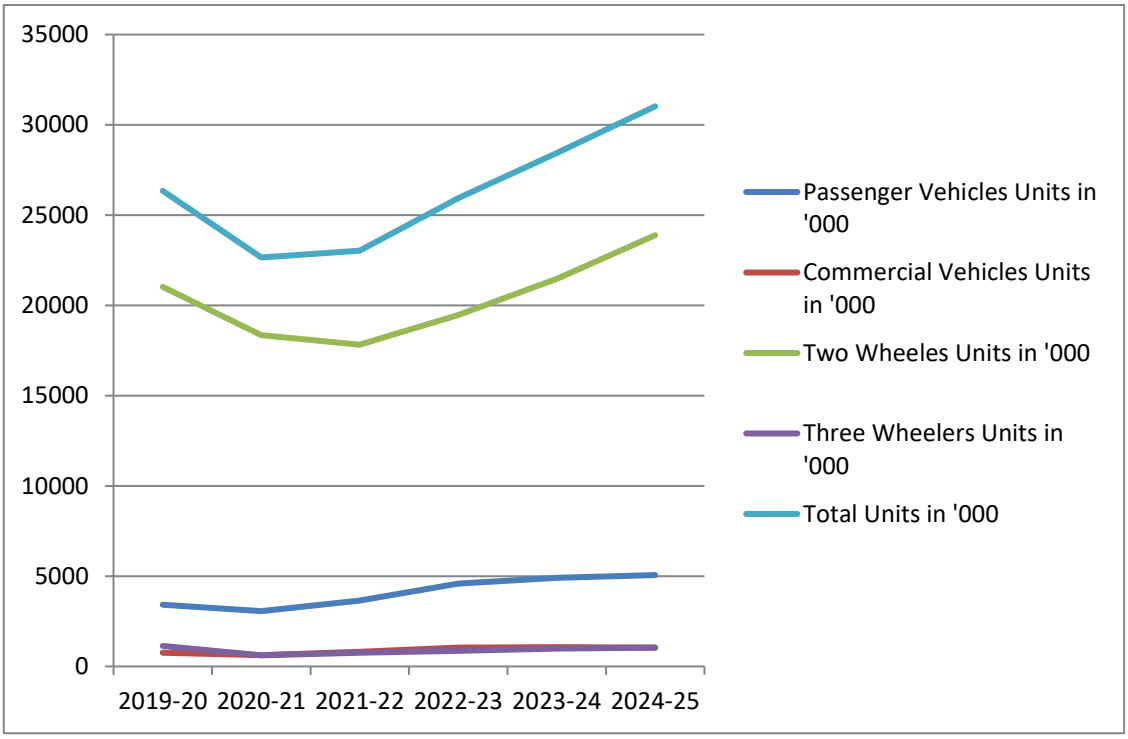

Figure 4.1.1: Segment-wise Production Trend of Automobile from 2019-20 to 2024-25

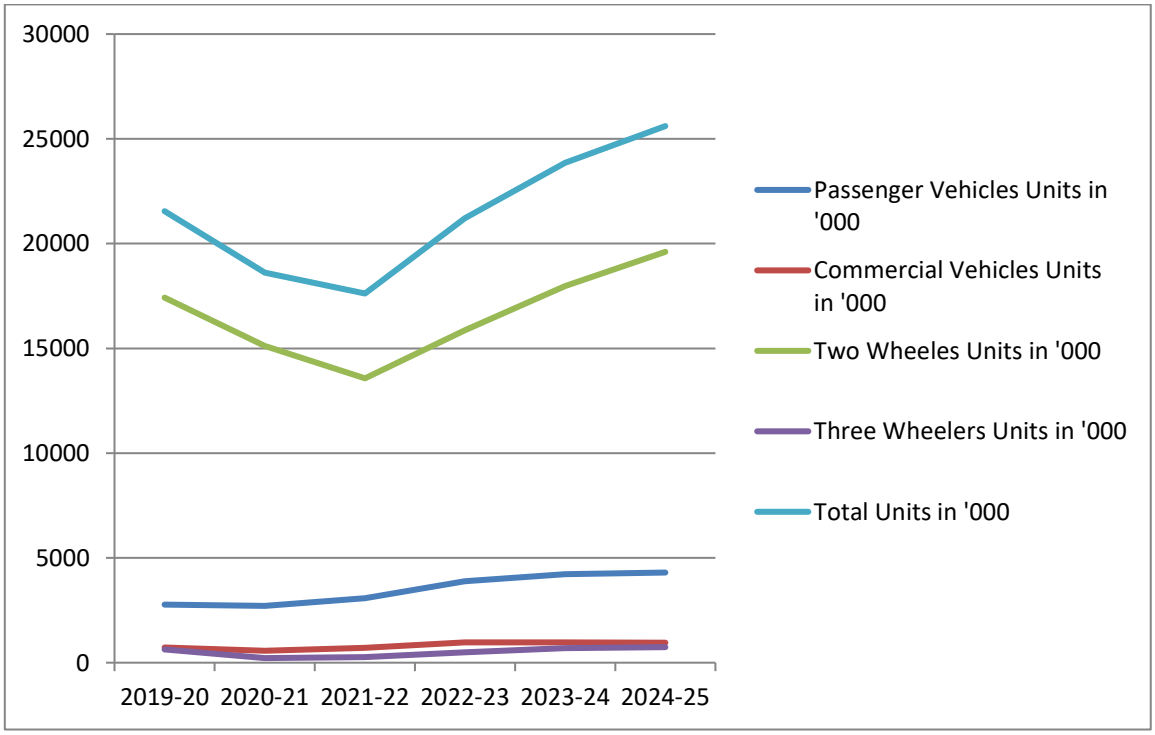

Figure 4.1.2: Segment-wise Domestic Sales Trend of Automobile from 2019-20 to 2024-25

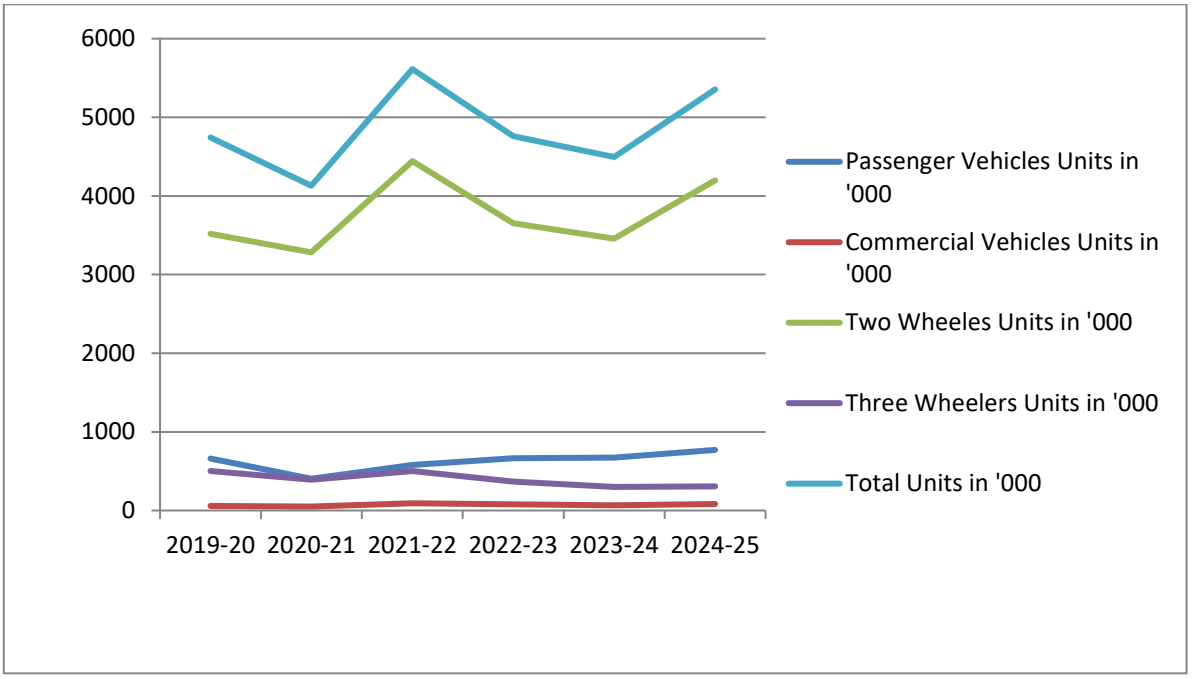

Figure 4.1.3: Segment-wise Export Sales Trend of Automobile from 2019-20 to 2024-25

4.2: Descriptive Statistics

Table 4.2.1: Segment Descriptives

Metric/Segment	Mean ('000)	SD ('000)	Cov	CAGR (%)	Max YoY (%)
PRODUCTION					
Passenger Vehicles	4,115	841	0.20	8.12	25.64
Commercial Vehicles	912	192	0.21	5.32	28.96
Two-Wheelers	20,336	2,254	0.11	2.14	11.25
Three-Wheelers	835	184	0.22	-1.26	23.41
Total	26,240	3,193	0.12	3.32	12.59
DOMESTIC SALES					
Passenger Vehicles	3,494	728	0.21	9.17	26.71
Commercial Vehicles	798	168	0.21	4.91	34.17
Two-Wheelers	16,592	2,168	0.13	1.99	16.90
Three-Wheelers	525	231	0.44	-2.15	87.36
Total	21,409	3,027	0.14	3.51	20.35
EXPORTS					

Passenger Vehicles	**625**	**124**	**0.20**	**2.55**	**43.07**
Commercial Vehicles	**114**	**25**	**0.22**	**5.13**	**38.42**
Two-Wheelers	**3,759**	**458**	**0.12**	**2.98**	**35.33**
Three-Wheelers	**52**	**18**	**0.35**	**-7.87**	**45.12**
Total	**4,850**	**548**	**0.11**	**2.46**	**35.91**

Computed by authors

Table 4.2.2: Aggregate V-Shaped Recovery Metrics: Production, Domestic Sales, and Exports

Metric	FY19-20	FY20-21 Trough	FY24-25 Peak	CAGR	Cov	Recovery %
Production	**26,348th**	**22,652nd (-14.03%)**	**31,028th (+9.12%)**	**3.32%**	**0.12**	**+36.90%**
Domestic Sales	**21,545th**	**18,620th (-13.58%)**	**25,607th (+7.34%)**	**3.51%**	**0.14**	**+38.47%**
Exports	**4,743th**	**4,130th (-12.92%)**	**5,356th (+19.13%)**	**2.46%**	**0.11 lowest**	**+30.43%**

Computed by authors

5. DISCUSSIONS AND IMPLICATIONS

5.1: Production Analysis

India's automobile industry production rose +36.90% from 26,348 thousand units to 31,028 thousand units (FY2020-25), achieving CAGR 3.32% with Cov 0.12, confirming textbook V-shaped post-COVID recovery, which is also shown in the trend line (fig.4.1,1) and Table 4.2.2.

Passenger Vehicles (PV) Production: Leads with the highest CAGR 8.12% and moderate Cov of 0.20, driven by SUV premiumization. Peak +25.64% YoY (FY2022-23) aligns with PLI approvals (18 OEMs); upward trend post-FY2021-22 validates BS-VI capex absorption.

Commercial Vehicles (CV) Production: CAGR 5.32%, Cov 0.21 confirms complete BS-VI transition cycle. Steady trendline post-FY2022-23 establishes mature infrastructure-aligned growth platform.

Two-Wheelers (2W) Production: Lowest Cov 0.11 validates 73% market share stabilization role. Conservative CAGR 2.14% with +11.25% max YoY reflects resilient festive cycles; V-shaped recovery mirrors industry aggregate. (fig.4.1.1)

Three-Wheelers (3W) Production: -45.72% COVID collapse (1,133→615 thousand units) yields CAGR -1.26%, Cov 0.22. Partial rebound to 1,050 thousand units (FY2024-25) signals persistent structural weakness.

5.2: Domestic Sales Analysis

Domestic Sales - Industry Aggregate: Cov 0.14 < production (0.12) indicates demand-led stabilization post-FY2021 inventory corrections; the highest CAGR 3.51% and +38.47% recovery reflect GST rationalization and SUV shift. A V-shaped recovery is noticed from the Trend line (fig. 4.1.2) and Table 4.2.2.

PV Domestic Sales: Supremacy with CAGR 9.17% exceeding production, driven by SUV premiumization and GST small-car relief (28% to 18%). Manageable Cov 0.21; upward post-COVID trend**.**

2W Domestic Sales: Cov 0.13 reflects rural-urban variance; CAGR 1.99% maintains 77% share leadership. V-shaped recovery established. (fig.4.1. 2).

CV Domestic Sales: -17.44% FY2020-21 dual-shock (BS-VI ₹70,000 Cr + lockdowns) leads to +65.28% recovery, CAGR 4.91%, Cov 0.21, peak +34.17% YoY. Mean 798 thousand units; maturity stabilization (-3.27% FY2024-25). (Table 4.2.1)

3W Domestic Sales: Catastrophic COVID decline (shared mobility aversion + BS-VI hikes) , partial CAGR -2.15%, extreme Cov 0.44, +87.36% FAME-II EV anomaly. (Table4.2.1). Policy dependence confirmed.

5.3: Export Sales Analysis

Export Sales - Industry Aggregate: Lowest Cov 0.11 despite +35.91% YoY extremes validates PLI predictability; +35.21% recovery establishes stable growth trajectory targeting 15% EV share by FY2030. A fluctuating trend is noticed. (fig4.1.3) and Table (4.2.2)

PV Export Sales: Balanced maturity (Cov 0.20 uniform); conservative CAGR 2.55% tempered by Africa/ME SUV demand (+43.07% peak). An upward trend is noticed in the post covid period. (fig4.1.3) and Table (4.2.1).

2W Export Sales: leading segment with CAGR 2.98%; Cov 0.12 confirms Bajaj/Hero ASEAN/Latin America dominance. However, a fluctuating trend is noticed during the study period. (fig.4.1. 3)

CV Export Sales: - Downward trend is noticed from the year 2021-22 with recovery in the year 2024-25 (fig.4.1.3). However, this segment is showing the highest CAGR5.13% among all other segments with Cov0.22.

3W Export Sales: significantly affected by COVID impact with poor CAGR -7.87%, with high Cov 0.35. indicating high volatility**.**

6. CONCLUSION:

This study has analyzed the COVID-19 impact and post covid period performance of the Indian automobile industry along with various segments. V-Shaped Recovery Confirmed: All three metrics exhibit uniform FY2020-21 contraction (-12.92% to -14.03%) followed by robust rebound averaging +10.75% annual growth, achieving FY2024-25 records across all dimensions. Domestic Sales Leadership is identified with the highest CAGR 3.51% and the strongest recovery +38.47% reflect GST rationalization impact (small cars 30%to18%) and SUV demand. Export Stability Anchor is established with the lowest Cov 0.11, despite the highest YoY volatility +19.13%, confirming PLI export incentives in establishing a predictable growth trajectory. In the Passenger Vehicles (PV) segment, dual leadership across production (8.12%) and domestic sales (9.17%), moderate stability (Cov 0.20-0.21) is observed. Commercial Vehicles (CV) shows Post-BS-VI stabilization complete (CAGR 5.32% production, 5.13% exports), consistent volatility (Cov 0.21-0.22). Two-Wheelers (2W): Stability anchor (Cov 0.11-0.13 lowest), export leadership (2.98% CAGR), volume dominance (73% production share). Three-Wheelers (3W):

Electrification volatility signal (Cov 0.44 domestic highest, +87.36% FAME-II peak), structural challenges (negative CAGRs).

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