



Industry Report on
Stainless Steel Sheets, Washers, Sheet Metal
Components and Pipes & Tubes

January 2023

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Annexure for Abbreviation used

GDP	Gross Domestic Product
GVA	Gross Value Added
IIP	Index of Industrial Production
PFCE	Private Final Consumption Expenditure
GFCF	Gross fixed capital formation
WPI	Wholesale Price Index
CPI	Consumer Price Index
y-o-y	Year on Year
m-o-m	Month on Month
IMF	International Monetary Fund
RBI	Reserve Bank of India
MOSPI	The Ministry of Statistics and Programme Implementation
Est., Adv. Est	Estimated, Advance Estimates
P, F	Projected, Forecast
USD	US Dollar
INR	Indian Rupee
Mn, Bn, Tn	Million, Billion, Trillion

Global Economic Overview

After a healthy rebound in 2021, the global economy is looking increasingly stagflation, as growth prospects for 2022 have worsened, and inflation remains sticky at record-high levels in the face of aggressive monetary tightening around the world.

Real GDP growth	2020	2021	2022P	2023P
World	-3.2%	6.0%	3.2%	2.7%
India	-7.3%	8.7%	6.8%	6.1%
China	2.3%	8.1%	3.2%	4.4%
Japan	-4.7%	1.7%	1.7%	1.6%
USA	-3.5%	5.7%	1.6%	1.0%
UK	-9.8%	7.4%	3.6%	0.3%
EU	-6.5%	5.2%	3.1%	0.5%

Source: International Monetary Fund, October 2022 Outlook

Uncertainty related to food and energy supply is a major risk to stable governance, debt sustainability and business continuity across developed and emerging markets. The three economic heavyweights - the US, China, and the EU - continue to grapple with a host of challenges. The US economy contracted for a second consecutive quarter in a row, with Q2 2022 real GDP growing at -0.2% (annualized growth at -0.9%). During the same period, China's GDP also shrank over the preceding quarter, while the EU narrowly avoided a contraction, growing at less than 1%. Consequently, even fundamentally strong, export-oriented developing markets are now facing weak growth prospects for the remainder of the year, and there has been a near wholesale downward revision in 2022 GDP forecasts.

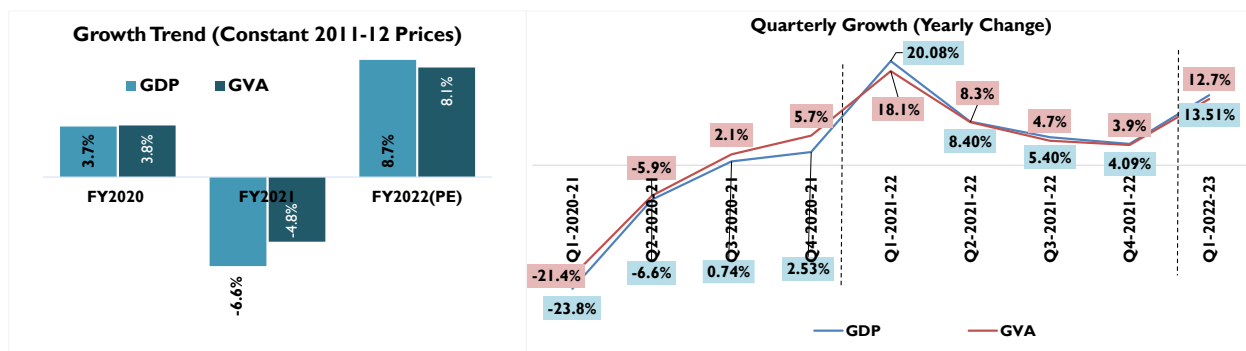
The US Fed delivered another strong rate hike (+75bps), which was hardly surprising, given inflation figures. We maintain that the Fed will deliver more hikes through 2023: inflation today is way above its target range and market expectations are likely to catch up with this economic reality. China's economic policymakers realize the challenge in meeting their annual growth target: focus has now moved to damage control. Low inflation offers room on monetary policy, which remains loose to allow credit flow; however, credit uptake is weak. The risk of a recession is most pronounced in the EU. European policymakers are grappling with potentially the most severe challenge. Russia's decision to halt gas supplies - first for three days, and then altogether - has added concerns that the European block may be staring at tight gas supplies through the winter. Also, unlike the U.S., inflation has not shown signs of peaking yet. The ECB's 50bps interest rate hike - the first in over a decade - could not stop the euro's slide, which hit parity with the dollar and remains under constant strain.

Droughts in parts of Europe, Mainland China and the US have upset inland navigation, hydroelectric power generation and agricultural output, adding to pre-existing supply chain strains; in addition to this, energy insecurity in Europe makes a stagflation scenario most likely in this part of the world. Through the summer months, large parts of the world, especially in the Northern hemisphere, were in the grips of severe droughts

and heatwaves. These long spells of droughts have upset hydroelectric power generation and hurt agriculture output. This forced transporters to operate with lower cargo loads, increased reliance on coal for energy, and further pressurised food and agricultural commodity prices. Together, these will prolong the supply-chain strains in the near term and, in turn, alter business decisions in the medium term.

Separately, parts of Asia, particularly Vietnam and India, also offer growth opportunities. It is worth highlighting that the Asia-Pacific region is entering a period of political and security volatility. Domestic politics in Australia, Malaysia, Thailand, and Pakistan have witnessed a series of dramatic events involving high-profile political leaders. At the same time, heightened rhetoric and military maneuvers rooted in Sino-US competition affects countries torn between the two giants, given their divergent economic and security interests. For business, this means an urgent assessment of supply routes, and enhanced monitoring on the security and compliance front.

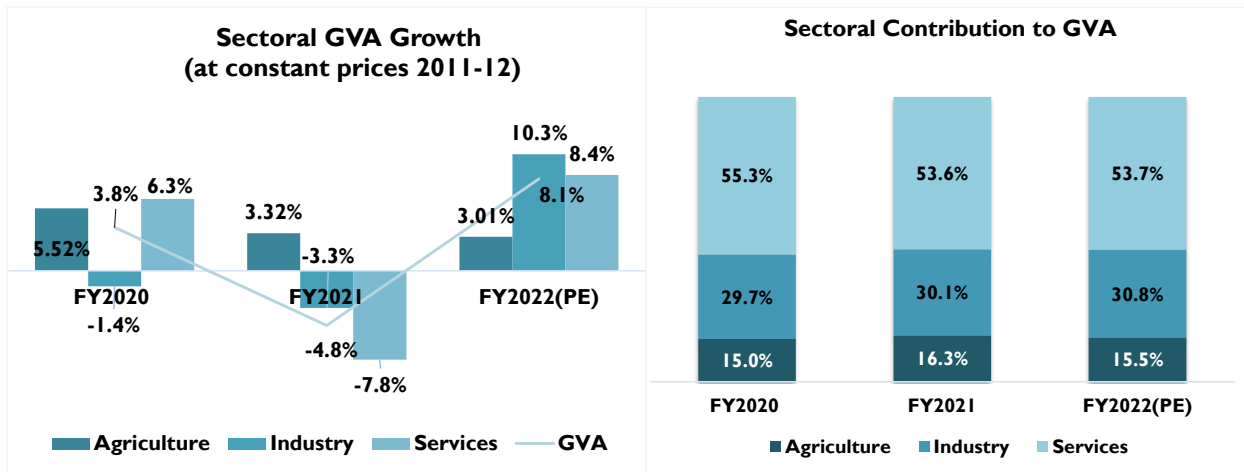
India’s Macro Economic Overview



Sources: MOSPI,

As per MOSPI estimates, despite the adverse effect of multiple waves of Covid-19 pandemic and associated localized lockdowns, the Indian economy rebounded well in FY 2022 and is estimated to have grown by 8.7%. Major relaxations in Covid-related restrictions and government relief measure for the pandemic hit sectors, policy reform, higher healthcare spending, and accommodative policy rate for considerably longer period etc. supported the economic recovery. The country also overachieved its export target despite the supply chain disruptions posed by COVID-19 restrictions, skyrocketing freight charges and container shortages.

On quarterly basis, the country growth expanded by 13.5% in Q1 FY 2023 against the high base of Q1 2022 when it expanded by over 20%. The Q1 GDP growth number are commendable as March to June period was flawed by global geo-political crises (Russia-Ukraine war), negative impact of heatwave on agriculture output, elevated commodity prices and steady inflation pressure from weak rupee value. During Q1 FY 2023, the country’s GVA grew by 12.7% against 18.1% y-o-y increase in the corresponding quarter last fiscal.



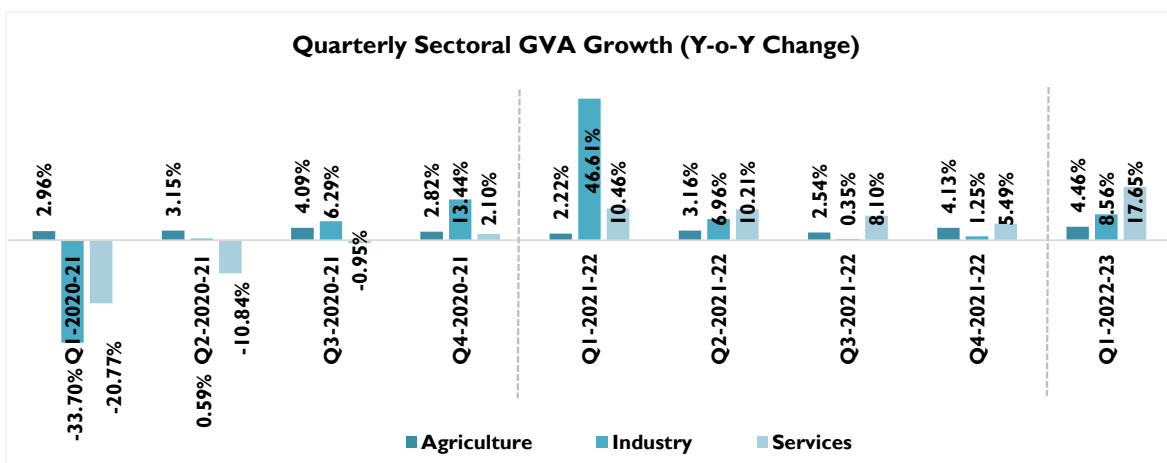
Sources: MOSPI

Sectoral analysis of GVA reveals growth returning higher to pre-pandemic level in FY 2022. GVA in the industrial sector and services sector both strengthened during FY 2022 while agriculture sector GVA observed some moderation in yearly growth.

In the industrial sector, growth across major economic activity such as mining, manufacturing, construction sector surged, and it registered a growth of 11.5%, 9.9% and 11.5% in FY 2022 against a decline 8.6%, 0.6% and 7.5% in FY 2021, respectively. Utilities sector observed a y-o-y growth of 7.5% against a decline of 3.6% in the previous years.

Talking about the services sectors performance, with major relaxation in covid restriction, progress on covid vaccination and living with virus attitude, business in service sector gradually returned to normalcy. Economic recovery was supported by the service sector as individual mobility returned to pre-pandemic level. The worst hit trade, hotel, transport, communication, and broadcasting segment registered 11.1% y-o-y growth in FY 2022 as compared to 20.2% contraction registered during FY 2021.

Quarterly GVA Performance



Source: MOSPI

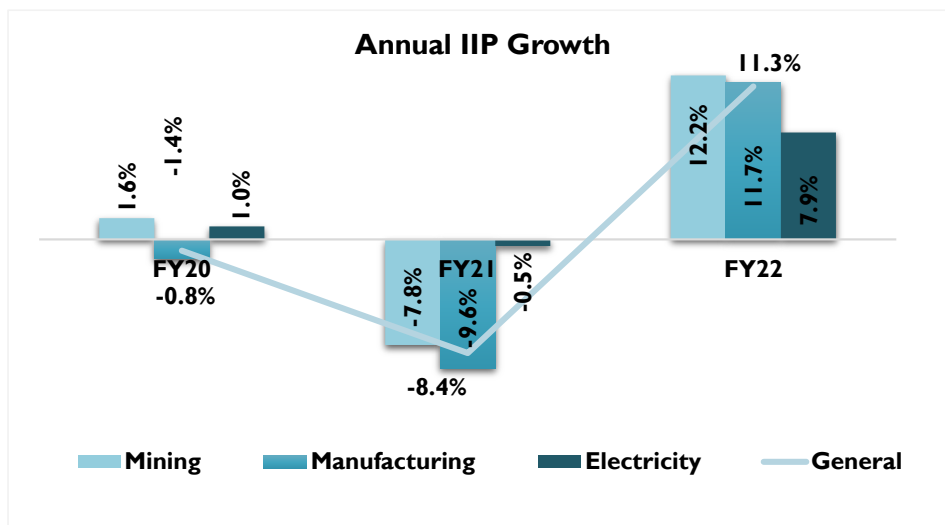
GVA number in Q1 FY 2023 improved against the three previous quarter but was sharply down against Q1 FY 2022 performance, since the post covid growth observed during Q1 FY 2022 was significantly high as it was measured against sharp negative base of Q1 FY2021. GVA number in Q1 FY 2023 was driven by healthy growth in industrial sector and service sector. Industrial sector output expanded by 8.56% against 1.25% y-o-y increase in the previous quarter and against the high base of 46.6% increase in Q1 FY 2021. Within industrial sector, GVA across majority sub sector strengthened in compared to last quarter growth and it was also remarkable against the high base in corresponding quarter of the last fiscal. Within industrial sector, construction sector was the bright spot as it registered 16.77% y-o-y growth in Q1 FY 2023 followed by electricity, gas, water supply & other utility services which grew by 14.67%, mining and quarrying by 6.46% and manufacturing by 4.83%.

Within service sector, the trade, hotel, transport, communication, and broadcasting segment strengthen and observed 25.6% y-o-y growth in Q1 as compared to 1.97% subdued growth last quarter. Other services sector broadly classified under Public Admin, Defence & Other Services and Financial, Real Estate & Professional Services too registered 26.34% and 9.24% growth in Q1 FY 2023 against 7.68 % and 4.27% y-o-y change in Q4 FY 2022.

Agriculture sector GVA strengthen in Q1 FY 2023 to register 4.46% yearly growth compared to both corresponding quarter last year (2.22%) and previous quarter (4.13%) in FY 2022. Any growth between 3.5-4% in farm sector is considered above the long-term trend line.

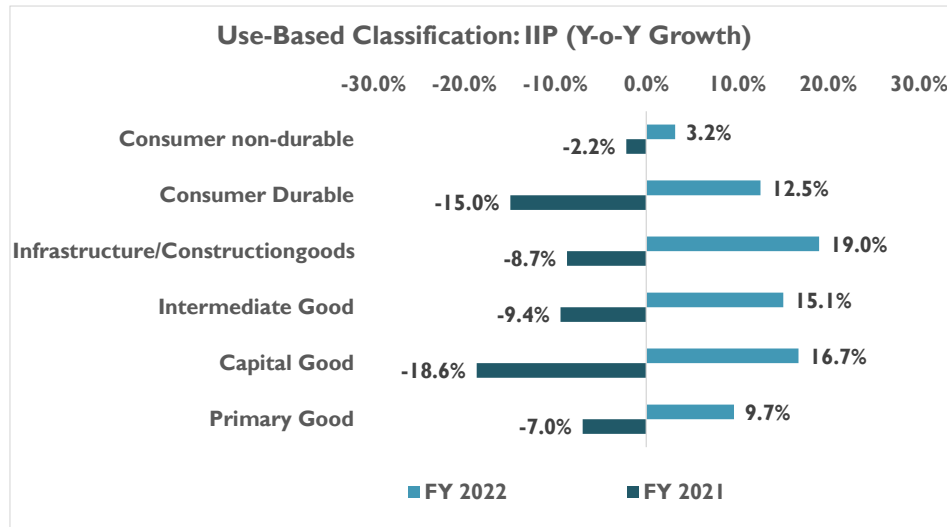
IIP Growth

After experiencing three years of deteriorating IIP growth, the country's IIP index registered 11.3% y-o-y growth where growth was evenly spread across all sub-segments. Manufacturing index, with 77.6% weightage in overall index, registered 11.7% y-o-y growth while mining sector index registered the highest growth.



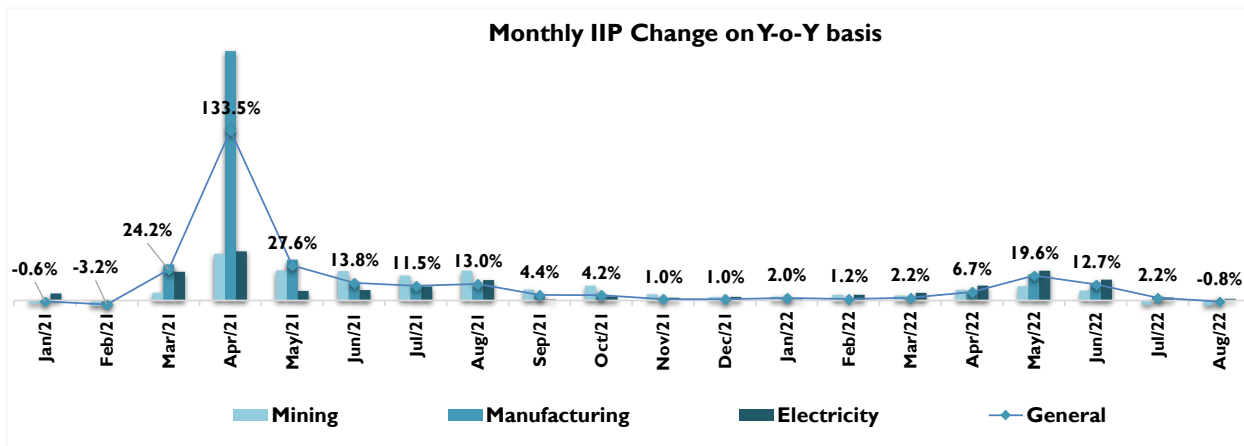
Source: MoSPI

On use-based classification basis, infrastructure/construction goods, capital good, intermediate good and consumer durable outperformed over the other sector and registered healthy double-digit growth.



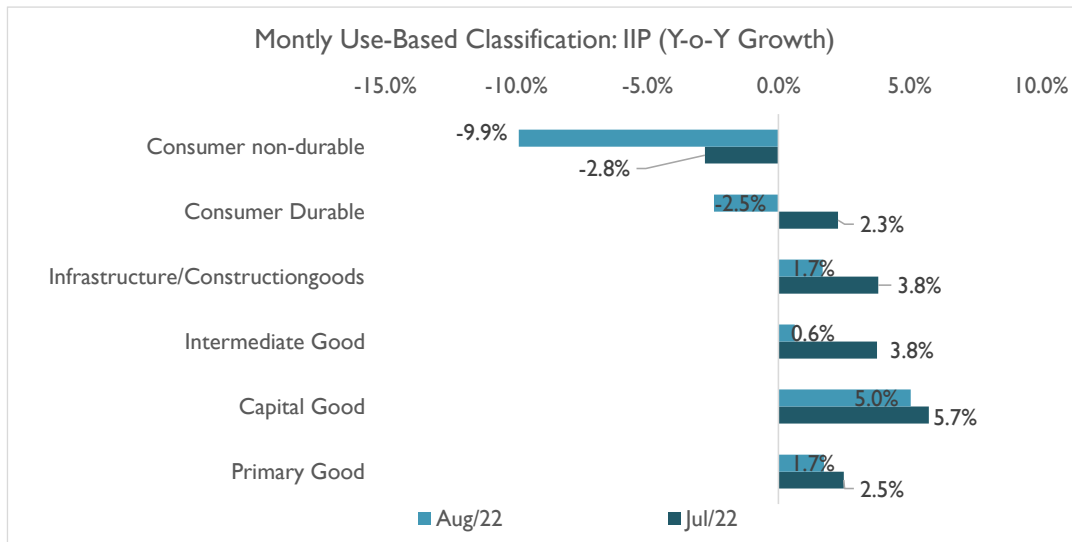
Source: MOSPI

Monthly IIP Performance



Source: MoSPI

In current year, IIP index which improved steadily between March to May moderated sharply in the subsequent three month and it measured 18 months low in August 2022. Manufacturing activity which has 77.6% weightage in the overall index, shrank by 0.8% in the August 2022 against 11.1% growth in August 2021. Mining activity too contracted by 3.9% in August 2022 while only electricity sector managed to register growth, however its growth rate again slowed down to 1.4% against 2.3% y-o-y growth in the previous month.

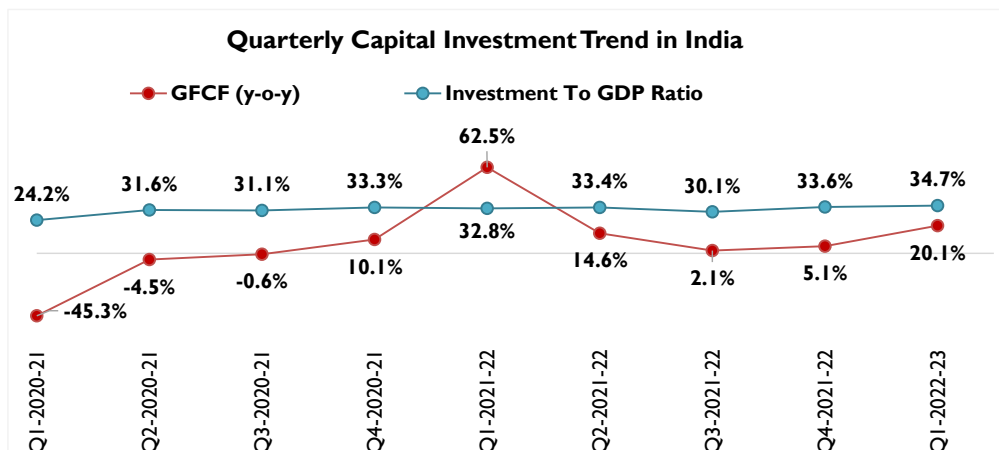


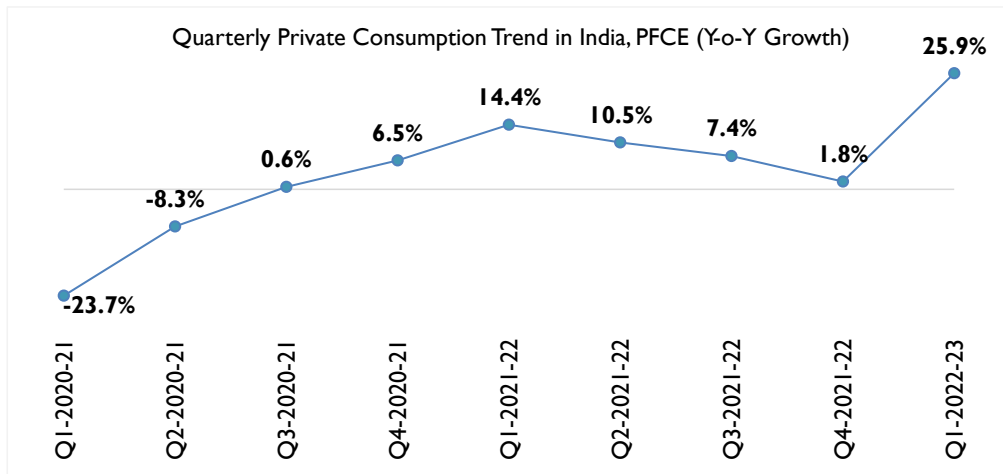
Sources: MOSPI

As per the use-based classification, growth in all segments deteriorated in August 2022 against previous month. Contracting IIP data points towards India’s plateauing economic recovery process as global headwinds, stagflation, stagnating export, and higher interest costs have started having adverse impact on manufacturing activity.

Growth Trend in Investment & Consumption Demand

Other major indicators such as Gross fixed capital formation (GFCF), a measure of investments, gained strength and registered 20.1% y-o-y growth during Q1 FY 2023 after witnessing a moderating growth in the previous three quarter on yearly basis. Although, it was substantially low compared to 62.5% y-o-y growth which was against a negative y-o-y base of Q1 FY 2021.



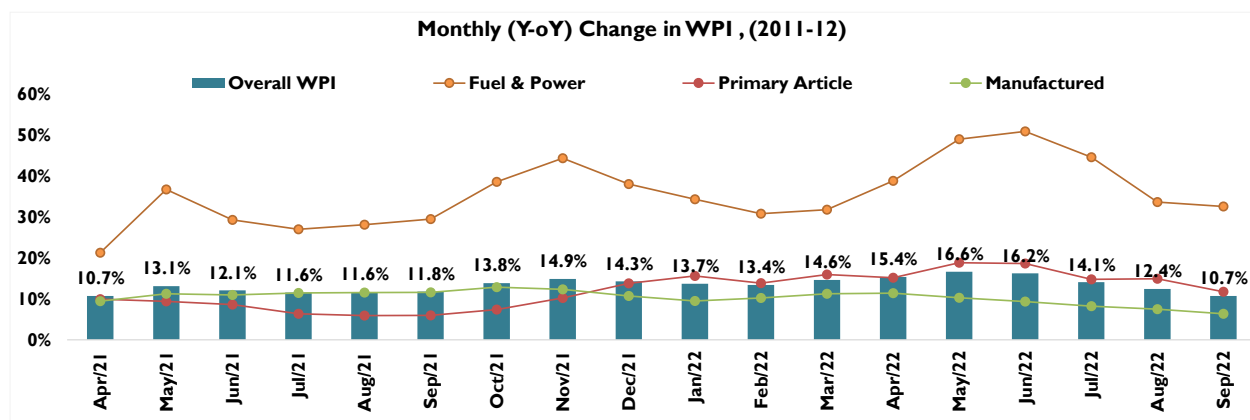


Sources: MOSPI

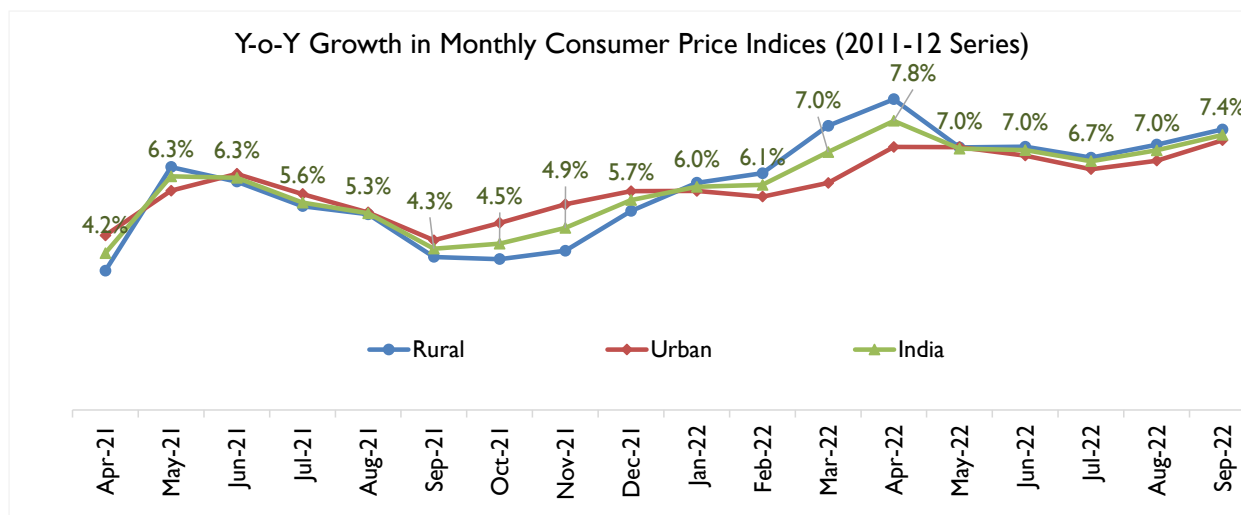
Private Final Consumption Expenditure (PFCE) a realistic proxy to gauge household spending, observed a sharp spike in Q1 FY 2023. Inflationary condition is believed to have led to this surge in PFCE. In the previous quarter, festive and marriage season purchases, and low base supported the higher than previous year growth in PFCE.

Price/Inflation Scenario

India's inflation rate based on Wholesale Price Index (WPI) moderated with 10.07% y-o-y change in September 2022 against 12.41% (y-o-y) increase in the August 2022. Surge in prices of rise in prices of mineral oils, food articles, crude petroleum & natural gas, chemicals & chemical products, basic metals, electricity, textiles etc. compared to corresponding month in the last fiscal, contributed to WPI inflation rate in September 2022. On m-o-m basis, WPI index for the month of September 2022 stood at -0.65 % as compared to August 2022. The WPI index for Manufactured good (weight-64.23%) contracted by 0.49%, Primary Articles (22.62%) contracted by 1.34% while fuel and power (13.15%) strengthened by 0.13% in September 2022 on monthly basis.



Source: MOSPI, Office of Economic Advisor



Source: CMIE Economic Outlook

Retail inflation rate (as measured by Consumer Price Index) continued to stay above 6% tolerance limit of the central bank for the 8th straight month and soared to 7.4% in September 2022 owing to a rise in food prices, particularly vegetable prices which by over 18% followed by spices prices which grew by over 16%. The inflated rate in Food Price Index observed 8.6% increase in September 2022 as compared to September 2021 price level.

As a part of anti-inflationary measure, the RBI has hiked the repo rate by 190 bps since May to current 5.9%, with latest fourth round hike announced on 30 September 2022. The Reserve Bank of India has estimated an average inflation rate of 6.7% for FY 2023 while it continued to remain above average 7.2% between April-September 2022.

External Sector

India's merchandise exports continued to grow at subdued CAGR of 4.4% during FY 2018-22 while imports grew at 4.8% CAGR. On annual basis, both exports and imports exhibited stellar performance in FY 2022 backed by recovery in global growth and domestic economic activity. Exports surged by 21% and import by ~30% in FY 2022 against -9.2% and -13.8% y-o-y change in the previous year, respectively. Improving foreign trade was backed by favorable base, elevated commodity prices and low policy rate that pushed domestic demand. However, the scenario turned unfavorable in the current fiscal with widening trade deficit, CAD breached the sustainable limit of 3% of GDP in July 2022 and expected to measure 3.3% in FY 2023.

Economic Growth Outlook

From being one of the fragile five to becoming the 5th largest economy in the world after overcoming the deadly pandemic shows that India has reached a remarkable milestone at a time when nations are struggling to fight against stagflationary and recessionary pressures. The Indian economy clocked a growth of 13.5% Q2

2022 aided by a favourable base effect after growing by 4.1% in Q1 2022. Nonetheless, the economy faces strong headwinds from global slowdown and tightening of global monetary policy. The expected demand pickup in the upcoming festive season, moderation in global commodity prices along with easing of supply side pressures should provide some respite to businesses in the near term. However, operating profit margins of firms have come under some pressure owing to the already high input prices and rising borrowing costs. Even as hawkish commentary by Fed officials on US monetary policy and rising US treasury yields have been driving yields higher, easing crude oil prices would continue to provide respite.

The Indian rupee depreciated by more than 8% (3rd Oct) from its level before the Russia Ukraine started in Feb (21). Downward pressure on rupee is increasing with widening of trade deficit. Trade deficit hit record levels in the past two months driven by the highest monthly import bill of more than US\$60 bn. Strength of dollar, likelihood of further US FED rate hike, although at a slower pace, and other geopolitical factors are likely to keep the exchange rate below 80 against the US dollar.

Sentiment of businesses remain subdued. Global recession fears and domestic slowdown might have impacted their optimism level of the CFOs which fell to the lowest level in two years in Q3 2022. Slowing global growth along with prevailing geopolitical risks and supply-chain disruption means risk of export growth momentum has now increased which has been supporting India's growth momentum till the 1st half of 2022. After recording the highest-ever quarterly level during Q2 2022, exports witnessed muted growth of 1.6% in August from its year ago level.

On the positive side, supply chain pressures are edging down in India. An index of supply chain pressures for India (ISPI) released by the central bank shows easing of domestic supply chain pressures. Stable demand conditions and improved business continuity are leading the traction in the logistics sector with railway freight, port traffic and domestic air traffic picking up pace. India has partnered with 17 countries to alleviate near-term transportation, logistics and supply chain disruptions and bottlenecks as well as long-term resilience challenges. Moreover, with the conclusion of the spectrum auctions for 5G in early August, the faster and wider data services available will lead to further internet penetration and many opportunities for social and business activities.

Stainless Steel Industry

Stainless Steel is a value-added product with high corrosion resistant properties. Higher levels of Chromium and additions of other alloy elements (Nickel, Molybdenum, etc.) enhance the corrosion resistance. Compared to traditional steel, stainless-steel has higher resistance to corrosion, superior aesthetic finish and higher life span. These features have helped in increasing the popularity of stainless-steel across the world.

High recyclability, resistance to corrosion and low maintenance properties has made stainless steel a preferred metal for application in diverse sectors railway, metro project, process industries, bridges, nuclear, airport, transportation, and kitchenware. Based on the content of alloying elements stainless steel is segregated into three: 200 series, 300 series and 400 series.

Three Distinct Series of Stainless Steel & their composition			
	200 series	300 series	400 series
Manganese	5.5 - 12%	2% maximum	1% maximum
Nickel	1 - 6%	6 - 22%	0.75% maximum
Chromium	10.5 - 20%	15 - 25%	10.5% minimum
Copper	1.5 - 2.5%	None	None
Iron	Balance	Balance	Balance

Series 300 stainless steel, which is an austenitic stainless steel with chromium nickel alloy dominates the with nearly 55% of domestic SS production. Excellent corrosion resistance, high wear & tear resistance, and higher strength at high temperature are some of the attributes that has made this series popular among all SS variants. 300 series is further subdivided into multiple segments, based on the content of alloying metal.

Stainless Steel Series 300: Subdivision (composition of metals other than iron)					
Alloying Metal	304	304L	316	316L	321
Chromium	18 – 20%	18 – 20%	16 – 18%	16 – 18%	17 – 19%
Nickel	8 – 10.5%	8 – 12%	10 – 14%	10 – 14%	9 – 12%
Molybdenum	0%	0%	2 – 3%	2 – 3%	0%
Titanium	0%	0%	0%	0%	5 x (C+N) Min-0.7%
Others*	2 – 4%	2 – 4%	2 – 4%	2 – 4%	2 – 4%

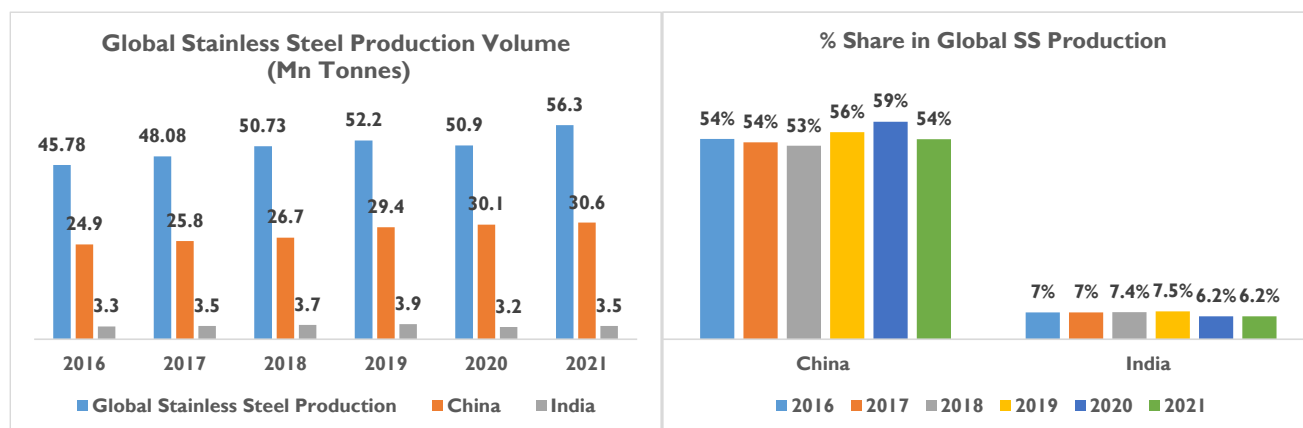
*Others: include traces of carbon, manganese, phosphorous, sulfur, silicon, and Nitrogen

Global Production and Consumption Pattern

Global stainless-steel melt shop production grew by 10.6% to 56.3 Mn Tonnes in 2021 compared to ~50.9 Mn Tonnes in 2020¹. In 2021, China with over 54% share in global SS production observed moderate 1.6% growth in 2021 against 2.5% y-o-y increase in the previous year. Talking about India's position in the global stainless-steel market, India with average 7% share in global SS steel output (during 2016-20), remained the second largest stainless-steel producer behind China till 2020. During the first half of 2022, approximately 29 million tons of SS was produced globally, which was nearly 3.8% higher than H1 2021.²

However, in 2021, the global SS production composition changed as Indonesia, the fourth largest SS producer jumped two places to become the second largest SS producer globally. SS production in Indonesia increased by an impressive 75% in 2021, over the previous year. Meanwhile India's SS output in 2021 was closed to 3.5 million tons. This realignment in global ranking also led to a drop in India's contribution to global SS production from nearly 7.3% in 2016, to approximately 6.2% in 2021.

Globally, cold-rolled flat products is the largest produced stainless-steel product in the world, followed by hot rolled coils, and steel wire rods & bars. According to International Stainless-Steel Forum, cold rolled flat products accounts for approximately 47% of total stainless-steel trade in the world. Hot coils, Semis-flat, Semis Long, Hot Bar/Wire rod, Cold Bar/Wire, Hot Plate & Sheet are another SS intermediary product traded globally.



Sources: International Stainless-Steel Forum

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¹ International Stainless-Steel Forum

² Internal Stainless Steel Form, Latest Data Release

Semis Long, Hot Bar/Wire rod, Cold Bar/Wire, Hot Plate & Sheet are another SS intermediary product traded globally.

Metal products – manufacturing of kitchen utensils and home ware – is the largest end use of stainless-steel, both globally as well as in India. Globally 37% of total SS consumption goes towards metal products segment while in India 12% of the stainless steel is used in construction and infrastructure, 13% in automobiles, railways and transport (ART), 30 % in capital goods and 44% in durables and household utensils and 1% in others. globally it stood at 37.7%. Process industry & engineering, architecture, building & construction, automotive, railway & transportation, and electromechanical industries are the other major consumers of stainless-steel products.

Global consumption of stainless steel reached approximately 42.3 million tons per annum in 2021, an increase of nearly 12% over previous year. This comes after a 7.8% decline in consumption in 2020 (compared to 2019), on account of Covid-19 related disruption. Consumption growth in 2022 is expected to be muted at 3.2%, to reach 43.7 million tons.³

Indian Stainless-Steel Industry

Since 2000, steel production in the country has seen a phenomenal increase as the sector witnessed high investments in capacity addition as well as technology up-gradation. In 2018, India surpassed Japan to become the second largest steel producer in the world, after China. According to World Steel Association (WSA), India produced 118.13 Mn tons of crude steel in CY 2021 and accounted for 6.1% share in global crude steel production. According to WSA's September 2022 update, India produced approximately 93.3 Mn tons of steel during January – September 2022 period, which nearly 6.4% higher than same period previous year. Unless there are no major disruptions, Indian steel industry would end the year with approximately 124 Mn tons of crude steel.

In 2021, India's crude steel production registered a robust y-o-y growth of 18% against 10% contraction in the previous year while it grew at a CAGR of 4% between 2017-21. Presence of such a vast primary steel manufacturing infrastructure coupled with the low-cost worker has also helped in the growth of secondary and finished steel products. On consumption side, India is also the second largest consumer of finished steel. The emergence of a middle-class consumer segment has altered the consumption landscape in India.

³ International Stainless Steel Forum

Production and Consumption Scenario

The Indian stainless-steel sector, the second largest producer (in 2021) and consumer in the world, has a total manufacturing capacity of more than 5 Mn tons of stainless steel annually. Since 2011, stainless-steel production has increased at a CAGR of 7.8% per annum from ~2.16 Mn Tonnes in 2011 to 3.93 Mn Tonnes in 2019. Barring 2020 for pandemic led decline, India's stainless-steel (SS) production has increased steadily between 2014-21. In 2020, India stainless steel production observed -19.4% over 2019 owing to Covid-19 pandemic induced depressed market condition. However, the industry rebounded well in CY 2021 as India's annual domestic stainless-steel production reached approximately 4.0 Mn tons, increasing by nearly 26% over previous year production⁴.

SS production and consumption observed V shape recovery where volume improved gradually with phase wise unlocking of the economy on the back of government stimulus and efforts put in place by the industry stakeholder. Flat products, which include steel slabs, sheets, plates, and coils account for ~75% of total stainless-steel production in the country.

Despite being one of the largest producers as well as consumer of stainless-steel, the per capita stainless-steel consumption in India remains low. India's per capital stainless steel consumption has increased from 1.2 Kg in 2010 to 2.5 Kg in 2019, however its consumption is comparatively lower compared to world average of 6 Kg per capita, This low consumption pattern is an indication of the inherent opportunities existing in the sector.

Regulatory Scenario

Iron and steel industry play a strategic position in the overall infrastructure industry. Therefore, the government has been taking sustained initiative on yearly basis towards the development of the industry. The Government has de-licensed the manufacturing of steel pipes and tubes, and caps on foreign investment has been removed. This move, as part of the larger industrial sector reforms which was implemented in 1991 and subsequent years, have helped in improving the technology level in the industry, apart from attracting capital. Further trade restrictions (primarily international trade) was also lifted as India became a signatory to global trade pacts. Currently, 100% FDI under automatic route is allowed in the steel sector.

National Steel Policy 2017:

This policy was initiated with the intention to create a globally competitive steel industry in India. It is an updated version of National Steel Policy 2005. The achievement targets outlined under National Steel Policy 2017 is likely to have a favorable impact on supply side dynamics and strengthen the indigenous manufacturing capabilities. Key policy objectives include

⁴ Worldstainless.org, 2022 year to date data at country level has not been released by the organization

- Increase the per capita steel consumption from current 63 kg to 158 kg by FY 2031.
- Reduce the dependency on imports of coking coal from 85% to 65% by FY 2031.
- Domestically meet the demand for high grade automotive steel, electrical steel, special steel etc. by FY 2031.
- Attain global standards in Industrial safety, reduce the carbon footprint and have energy efficient steel production.

Strengthening the raw material supply chain: To reduce dependency on steel imports, in Dec 2020, the Ministry of Steel, Government of India, signed a Memorandum of Cooperation (MoC) with the Ministry of Economy, Trade and Industry, Government of Japan, to boost the steel sector through joint activities under the framework of India - **Japan Steel Dialogue**. On 14th October 2021, the Ministry of Steel also signed MoU with the Russian Federation for cooperation in the field of coking coal, used for steel making. This initiative is expected to strengthen the steel sector in terms of, capacity building, energy efficiency, trade and investment etc. which bodes well for the steel washer including SS washers.

Steel Quality Control Order: To ensure the availability of quality steel to the industry, the Ministry of Steel introduced the '**Steel Quality Control Order**' banning sub-standard/ defective steel products both from domestic players & imports. As per the Order, it is ensured that only quality steel conforming to the relevant BIS standards is made available to the end users in the country. As on Dec 2020, 145 Indian Standards have been notified under the 'Quality Control Order' which covers carbon steel, alloy steel and stainless steel. In addition, goods & articles made up of steel such as stainless-steel pipes & tubes, laminations/ cores of transformers, products of tin plate & tin free steel etc. have also been notified to prevent circumvention of the 'Steel Quality Control Order'. During the year 2020, 78 additional Indian Standards have been notified under the 'Quality Control Order'. The order excludes product meant for export as Indian manufacturers making product for export purpose are required to comply with the destination market standard.

Domestically manufactured iron and steel products policy (DMISP)

On 8th May 2017, the Government released a DMISP policy to prefer the domestically manufactured iron & steel products in Government procurement. To align with the Government "Atmanirbhar Bharat" scheme, Ministry of Steel notified amendments / additions to the DMISP Policy in Dec 2020 which was last revised, 2019. The amended policy further broadens the scope of the policy to promote domestic manufacturing in the steel sector. Domestic steel has been defined as one which has been manufactured in India with value addition ranging from 15-50%. So far (till end of 22nd March 2022), the Policy has led to import substitution of more than INR 224 Bn worth of steel which indicates increasing usage of domestic steel in government procurement thereby contributing in creating more job opportunities and strengthening the overall economy.

Union Budget 2022-23 Announcement & Steel

- NIL Basic Custom Duty (BCD) on scrap of iron or steel including stainless steel that is applicable up to March 31, 2022 is being extended up to March 31, 2023. Continuation of NIL BCD on scrap imports is positive for sector.
- Tariff rate of scrap of iron or steel is reduced to 2.5% from 5%. Therefore, once the exemption from duty on these scraps expire, the BCD rate shall operate through tariff.
- Rescinds anti-dumping or countervailing duty on following products of steel are revoked with effect from February 1, 2022:
 - Straight length Bars and Rod of alloy Steel from China PR,
 - High Speed Steel of Non-Cobalt Grade from China PR, Brazil, Germany.
 - Flat rolled products of steel (Al or Zinc coated) from China PR, Vietnam, and Korea RP.
 - Hot rolled and cold rolled stainless steel flat products (from China PR).

Demand from Government Initiatives

National Infrastructure Pipeline (NIP)

Good infrastructure is essential to support overall economic growth. As the government targets to make India a USD 5 Tn economy by 2025, infrastructure remains a thrust area for the government. The government remain committed of creating new and upgrading existing infrastructure to raise the quality of life and ease of living in India to global standards. In December 2019, an investment worth INR 102 Tn was announced by the government on infrastructure projects over the next five years under the National Infrastructure Pipeline (NIP). The task force on NIP increased this amount to INR.111 Tn in May 2020 from its initial projection of INR102 Tn which translate in per year spending of around INR 22 Tn. The Centre (39%) and state (40%) are expected to have almost equal share in implementing the NIP in India, followed by the private sector (21%). The amount allocated under NIP will be spent on building highways, railway lines, ports and airports and other social and economic infrastructure.

Sub Sector	Amount to be invested between 2020-25 in INR Bn	% Share in Total Investment
Road	20,338	18.3%
Railway	13,676	12.3%
Aviation	1,434	1.3%
Urban Infrastructure	19,193	17.2%
Industrial Infrastructure	3,150	2.8%
Others	53,514	48.1%
Total	1,11,304	100%

Although substantial investment planned under NIP which will propel the demand for several critical metal component including SS washers.

Urban Infrastructure

The task force National Infrastructure observed that by 2030, around 42% of India's population would be urbanized from the current 31%. Hence, urban infrastructure needs to be modernized at par with global standard to improve the ease of living of its citizen. Atal Mission for Rejuvenation and Urban Transformation, Smart Cities, Mass Rapid Transport System, Affordable Housing, Jal Jeevan Mission etc will be key focus area for development. NIP vision

- Housing for all by 2022 under PMAY and negligible slum population in urban areas.
- All households to have piped water meeting national standards by 2024.
- Waste-water collection, treatment/recycling to national standards in all towns across India
- Urban mobility – mass rapid transit system (MRTS) and bus connectivity within 800 m of homes in more than 50 cities

The Government of India has announced several policies and urban development initiatives. These include three -mega flagship schemes i.e Smart Cities Mission, the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and Housing-For-All that will have a spillover effect on the demand for overall economic growth.

Union Budget 2022-23 & Infrastructure Sector Announcement

The government continued with its thrust on infrastructure expenditure as in the last budget. In FY 2023, the capital expenditure is budgeted to be 19% of total expenditure vs 16% in FY 2022 and 12% in FY 2020 as well in FY 2021. In combination with Grants in Aid for creation of capital assets, the allocation for effective capital expenditure stands at around INR10.68 tn as compared to INR 8.4 tn in the previous year, recording 27% growth. In FY 2023 (BE⁵), Capital expenditure stands 4.14% of GDP higher than 3.62% in FY22 (RE⁶). Steady increase in infrastructure spend would act as an automatic stabilizer for the economy while generating jobs and boosting demand. The budget focuses on greater state participation through the Gati Shakti initiative and inclusive infrastructure development through initiatives for the Northeastern states and steps taken for greater participation of farmers and small businesses. The government's PM Gati Shakti initiative, largely comprising of seven pillars namely roads, railways, airports, ports, mass transport, waterways, and logistics

⁵ BE stands for Budget Estimate, which is a forecast of capital required for a project

⁶ RE stands for Revised Estimate. Revised budget estimate in case the BE is insufficient / falls short of requirement

infrastructure, are expected to play a major role for building world-class modern infrastructure and accelerate SS washers demand in India.

Higher Budgetary allocation in Major end user industries

Centre's Actual Budgetary Support (Capital Outlay Disbursement) (INR Bn)

Sectors	Actual					Estimates	
	FY'17	FY'18	FY'19	FY'20	FY'21	FY'22 R.E.	FY'23 BE
Roads & Bridges	437.7	535.2	697.6	707.1	922.9	1138.8	1803.0
Railway	452.3	434.2	528.4	678.4	299.1	1170.0	1369.8
Housing	9.8	12.6	10.9	9.6	11.3	15.8	18.1
Urban Development	14.3	32.5	24.4	37.1	17.2	43.6	37.3
Power	20.7	13.2	16.4	7.7	5.6	6.1	13.5
Civil Aviation	27.1	18.4	39.8	0.2	0.4	621.1	0.8

Within the total capital outlay (for sector considered), budgetary support to transport sector particularly railway and roads & highway has always remained in focus. Budgetary allocation for road & highway sector has increased at 21% CAGR between FY 2017-21. In FY 2023, allocation to road sector was up by 58% over the previous year revised estimate while railway was up by 17%.

Atmanirbhar Bharat packages

To support economic revival post Covid-19, the government in May 2020 announced first stimulus package. The first economic stimulus of INR 20 Tn was announced on 13th May 2020 and subsequent two more Atmanirbhar Bharat packages of INR 730 Bn on 12th October 2020 and INR 2.65 Tn was announced on 12th November 2020, bringing the total stimulus package at INR 29.87 Tn. Moreover, the government has decided that Global tenders will be disallowed in government procurement tenders up to INR 2 Bn which will boost demand for indigenously manufactured product. In addition, PSUs are restricting local traders of foreign pipe manufacturers for participation in their tenders, thereby encouraging the growth of domestic players in Indian market.

Production Linked Incentives (PLI) Scheme

The government has announced INR 1.97 Tn to be spent in the next 5 years for PLI schemes in 13 Sectors which include advanced chemistry cell battery, electronic products, automobiles and auto components, pharma, telecom and networking products, textile, food products, white goods, and specialty steel. The scheme targets to create and nurture manufacturing global champions for an Atmanirbhar Bharat, help

manufacturing companies become an integral part of global supply chains, possess core competence and innovative technology, and create employment opportunities.

Various other policy decision such as changing the definition of MSMEs and encouraging the scope for private participation have been introduced as a part of Atmanirbhar Bharat package which will have a favorable impact on domestic manufacturing and SS pipes & tubes.

PM Gati Shakti National Master Plan

On 15 August 2021, the government announced **PM Gati Shakti - National Master Plan** worth INR 100 trillion that aims to boost economic growth (Shakti) through infrastructure building over the next five years. PM Gati Shakti is a national infrastructure master plan that has the potential to bring a transformational change in the multiple sectors including steel and thereby supporting the Government's plan to position India as a global manufacturing hub. As a part of the PM Gati Shakti National Master Plan following announcement were made in Union Budget 2022-23

- The budget announced to develop 100 PM Gati Shakti Cargo Terminals for multimodal logistics facilities during the next three years.
- The government proposes to award contracts for implementation of multimodal logistics parks at four locations through PPP model in FY23.

The various initiatives for infrastructure development under the PM Gati Shakti will propel the demand of steel in various sectors thereby enhancing steel usage and growth of the steel sector.

National Manufacturing Policy

The stated objective of the Government to increase the share of manufacturing sector in national GDP from the current level of 12 – 14% to 25% by 2022 is expected to benefit process control equipment manufacturing. National Manufacturing Policy and Make in India initiatives, implemented to achieve this objective would benefit the segment.

Additionally, the move towards “Industry 4.0,” which focuses on encouraging Companies to adopt best in class manufacturing practices would have a positive impact on process control equipment segment. “Industry 4.0,” which is intended to reshape the manufacturing segment by focusing on automation as well as improving efficiency could create demand for process control equipments and systems.

Major Announcement in Infrastructure sector

- 58% increase in capital expenditure for Roads and Bridges to INR 1.80 tn in FY23 (BE).
- 17% increase in capital expenditure for Indian Railways – Commercial Lines to INR 1.37 tn in FY23 (BE).
- INR 480 bn is allocated for completing 8 mn houses for beneficiaries of PM Awas Yojana.

- National Ropeways Development Programme (Parvatmala) in difficult hilly areas and congested urban areas to improve connectivity and convenience where conventional mass transit system is not feasible. Contracts for 8 ropeway projects for a length of 60 km will be awarded in 2022-23.

Significantly higher capital expenditure planned towards sectors with higher metals consumption intensity such as Railway, Road and Bridges, Water infrastructure and Affordable Housing is positive as this will support demand for metal. However, Removal of anti-dumping duty on certain imports from specific countries with effect from February 1, 2022 and higher commodity price cycles put a dent in otherwise positive announcements.

SS Sheets

Stainless Steel (SS) sheet is a thin flat piece of stainless steel that has a wide range of applications. Depending on the grade of SS used, size, thickness and finish SS sheet finds application in sectors ranging from architecture, building & construction (ABC), automotive, railway & transport (ART), food industry, process industry, and aerospace, among others. The corrosion resistance attribute of the material, along with the ability to incorporate custom finishes has helped increase the usage of SS sheet.

Thickness (or gauge) of the material is used to differentiate SS sheet from other flat products like plates and foils. Typically, SS flat piece with thickness below 6 mm is considered as a SS sheet, while anything above that falls into the category of SS plates. SS foils, on the other hand are the thinnest of flat products and are thinner than SS sheet. The most commonly used SS grade for making both sheet and plate are 300 and 400 series, each differentiated by the type & percentage of alloy included.

- Type 300 series contains austenitic chromium-nickel alloys and finds applications in construction, transport, food industry, surgical applications, marine, and high-temperature applications. Type
- Type 400 series contains ferritic & martensitic chromium alloys and is widely used for making steel cutleries.
- **SS Finishes / SS finishing sheets**
- Finishing is a design element which becomes significant when the external appearance is of importance. SS finishing steel is used for decorative as well as non-decorative applications, with the type of finish imparted depending upon the end use applications. Today SS sheet is available in a variety of standard as well as specialized designs, depending upon end user customer specifications. All the various finishes are categorized into three broad segments – mill finishes, mechanically polished finishes, and special finishes.
- Apart from appearance, polished SS sheet is also important where a stain free and sterile surface is required. Usage in kitchens and sanitary application is one such example, where a sterile surface as well as low changes of bacterial contamination is important.

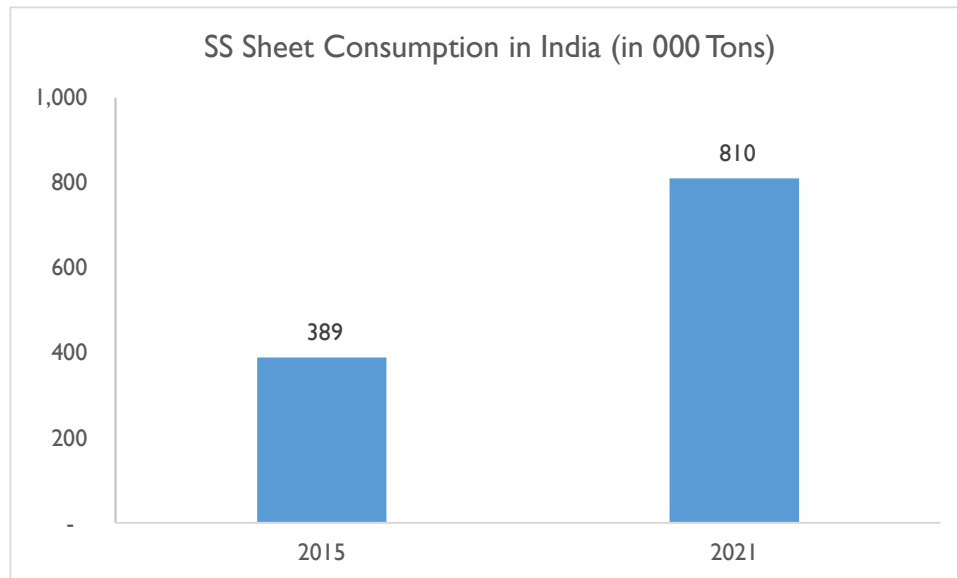
Notable type of finishes	
No.1 Finish	Manufactured by rolling heat treated SS sheet. An additional heat treatment follows to give it a uniform microstructure. This is the roughest of all the finishes and is rarely used in fabrication.

No.2 Matte Finish	One of the most common SS finishes used and has a non-reflective appearance with good flatness. It is the most preferred finish for fabrication operations.
No.3 Brushed Finish	Achieved by either mechanical polishing with finer abrasives or by-passing SS coil through special rolls that emulates the appearance of mechanical abrasion. It is most commonly used in food production & food service.
No.4 Finish	This has much more uniform and smoother finish. No.4 finish finds usage in commercial kitchens, elevators & escalators, hospitals & areas where a sterile & polished surface is required. It is also the preferred finish for architectural applications.
No.6 Finish ⁷	Less reflective than No.4 finish. It sports a dull silver white finish and its usage has been declining and is rarely used today.
No.7 & No.8 Finish	Both these finishes possess a high degree of reflectively, imparting a mirror like appearance. This finish has a high maintenance cost, and is commonly used in panels, columns, and exterior cladding in high end office buildings & hotels.

Domestic Consumption Pattern

Annual consumption of SS sheets in India is approximately 810,000 tons in 2021. This includes SS sheets used for functional purposes as well as aesthetic purposes (decorative sheets). Consumption has been increasing by a CAGR of 13% during the last five to six years. Architecture, building & construction (ABC) segment and automotive, railways & transportation (ART) are the two major sectors that are driving the demand for SS sheets.

⁷ Common Stainless Steel finish classification does not mention any No.5 finish, hence the absence of such a classification in the table



Dun & Bradstreet Research

Key Demand Drivers

Two of the key segments that are driving the demand for SS sheets are Architecture, Building & Construction (ABC) and Automotive, Railway & Transport (ART). In ABC, the usage is primarily on roofing and cladding (external and internal), with external cladding by SS decorative sheets. In addition, the usage in elevators & escalators too comes under this broad segment. In ART segment, the usage is primarily in the construction of bus bodies, as well as coaches (metros and railways). Although SS is used in auto components, the usage is mostly SS long products.

Demand Architecture, Building & Construction (ABC) Segment

Changes in building design & construction techniques has led to the introduction of a wide variety of building materials. Key among this is the design element that involves exterior cladding or an outer skin for buildings meant to improve its aesthetics.

Stainless steel sheets (SS sheets) with a wide variety of finishes meets this aesthetic requirement and emerged as one of the several candidates for exterior cladding. However, the factors that tilted the balance in its favor include its superior corrosion resistance, ability to hold its form under extreme natural elements (stress, sun & rain), and flexibility to fabricate into any shape required. Moreover, the cost effectiveness of the material together with its recyclability too helped, with the later gaining prominence due to the increasing interest in green buildings.

The usage of stainless steel (SS) in construction industry is not new, and is used extensively for load bearing, railings, plumbing applications, and HVAC, among others. All these applications were mostly from a functional

perspective – utilizing its corrosion resistance and other properties. Its usage as a decorative element is relatively recent, and in a country like India this application trend is still to become widespread.

Increasing focus on aesthetics & design elements:

More and more customers in India are demand for buildings with improved aesthetic and design elements. This is especially true in commercial buildings that cater to ITES, and new age service segments. Two other segment which is witnessing a shift is the retail space, especially large shopping malls and hypermarkets, as well as hospitality space. Compared to these, exterior design (aesthetic appeal) is yet to become a key element in institutional building construction.

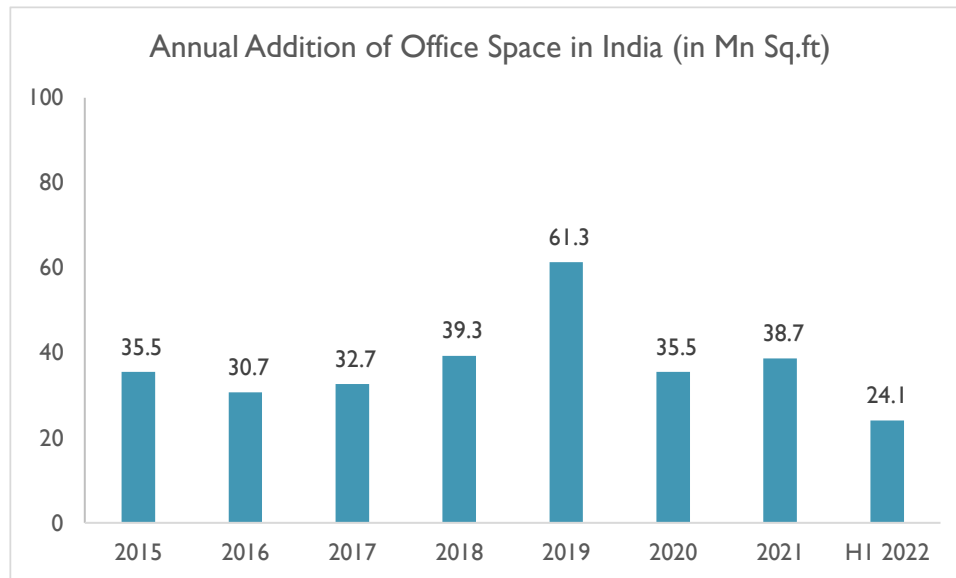
Increasing demand to incorporate aesthetic elements in commercial, retail and hospitality buildings is accompanied by a pickup in construction activity in these segments. Commercial building design (including office space, retail, and hospitality) has undergone a change during this period, as it is increasingly incorporating design elements from western markets. The glass and metal façade buildings that are synonymous with urban conglomerates in western markets is getting replicated in India.

Office building construction scenario in India

Since 2015, India has been adding nearly 35.5 mn sq.ft of new office space every year (except 2019 when the annual addition was in the range of 61.2 mn sq.ft⁸. With IT-ITES sector accounting for nearly 80% of office space absorption every year, new addition is driven by expected demand from this sector. The dominance of IT-ITES in office building segment is a positive for SS sheet used for decorative purposes, as the focus on aesthetic element in building design is highest among this particular customer segment. Thus the 35.5 mn sq.ft of office space construction every year is providing a huge market for SS decorative steel, for usage in exterior cladding and design⁹. During the first half of 2022 (HI 2022), approximately 24.1 mn sq.ft of office space was added, which represents a 61% jump in addition over HI 2021.

⁸ 2019 has been treated as an exception year, and avoided from Average calculation

⁹ Cumulative space in top 8 cities in India: Ahmedabad, Bengaluru, Chennai, Hyderabad, Kolkata, Mumbai, NCR & Pune



Source: Knight Frank, Industry Sources

Growth in Organized Retail Space

Currently, retail accounts for a small portion of the Indian real estate market. While the traditional and unorganized retail segment is still the dominant one in the country, organized retail is gaining ground at brisk pace. Malls & hypermarkets, which represent the organized retail space in India, is primarily concentrated in metros and tier I cities. Although few national brands in organized retail have started venturing into smaller towns, this yet to translate into demand for large retail space like malls. This concentration in large urban markets meant, the consumption of SS sheet for decorative purposes has largely concentrated in large cities.

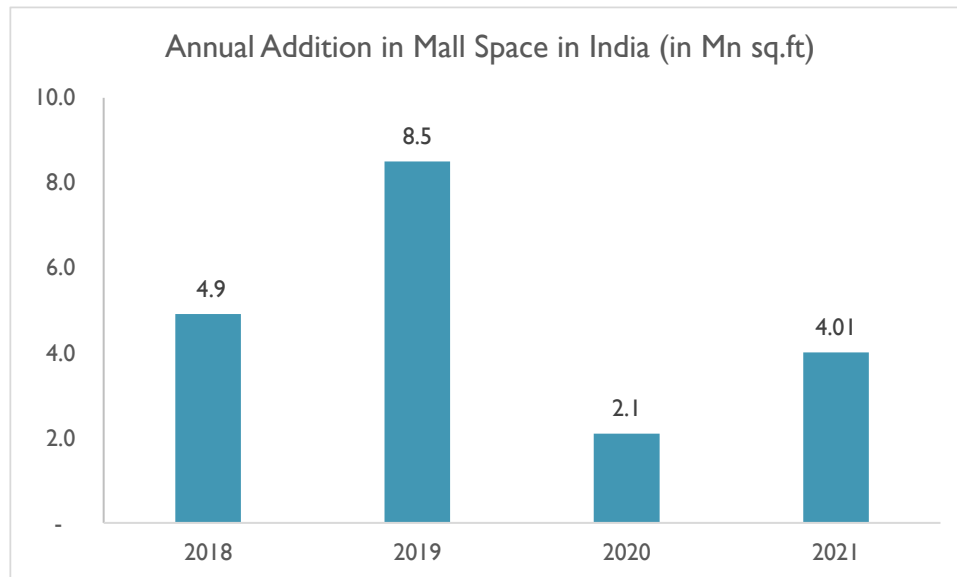
As per a report by ANAROCK property consultant (released in 2019), nearly 18.2 mn sq. ft of mall space was expected to come up in Tier II & III cities by the end of 2022. This forecast was based on the changing consumption pattern, purchasing power, demographic shift, and aspiration changes in smaller towns. Although the spread of Covid-19 has impacted this prediction, the long-term trend is pointing to higher penetration of mall space in smaller towns.

As per a report by CBRE¹⁰, the total organized retail sector stock in India is nearly 77 mn sq. ft, as on HI 2022¹¹. Annual mall space addition reached a high of 8.5 mn sq. ft in 2019, a record high, increasing by nearly 73% over previous year. The year 2020 is an anomaly, as the spread of covid-19 and resultant lockdown impacted new construction. As a result, mall space addition in 2020 fell by nearly 75% in 2020. However, the

¹⁰ CBRE India Retail HI 2022

¹¹ Cumulative space across six major cities: Delhi, Mumbai, Bengaluru, Hyderabad, Pune, and Chennai

scenario has improved in 2021 – despite the second wave of the pandemic – with nearly 4.5 mn sq.ft of new mall space addition.



Source: Industry Sources, CBRE Report

Given this expansion in mall space / organized retail space, the demand for building materials from this segment have witnessed an increased. Exterior metal cladding has become a constant design element in mall construction in India, with most of the malls coming up having a mix of glass and steel-based exterior. As a result, the offtake of SS sheet metal as decorative component in mall space in India is increasing.

Growth in Hospitality Space

Compared to office space and malls, the usage of metal for exterior cladding is relatively low in hotel construction. Given the aesthetic element, together with durability and cost saving the prospect of SS sheet metal usage picking up in hotel construction space cannot be ruled out. This sector could emerge as a demand driver in the coming years, subject to the evolution of architectural design elements.

Green buildings and its impact

According to World Green Building Council, a green building is a building whose negative impact on environment – generated by the way of design, construction & operation – is limited while capable of creating positive impacts. Few of the factors that characterize green buildings include – efficient usage of water & energy, usage of renewable energy, and usage of material that is recyclable and sustainable. Any building which has these attributes built can be categorized as a green building.

Stainless steel products, due to its recycling nature, qualifies as a construction material in green building construction. Apart from its recycling attribute, its long service life (imparted by its resistance to corrosion

and ability to withstand natural elements in case of external usage), and hygiene characteristics are also making it a material of choice for the green building industry.

India has risen to become the fourth largest green building market in the world, in terms of build volume. According to Indian Green Building Council, there are nearly 7,000 green certified building projects while the total area that comes under the category of green building is estimated to be nearly 8 bn sq.ft. Such a wide network of projects and large green building footprint points to an aggressive growth in green buildings in India.

The recyclability and lower carbon footprint (due to high life cycle) makes SS sheet an excellent material of choice for green building construction. Given the traction that green building has generated in India, and the future demand – the potential market for SS sheet (for exterior cladding & decorative elements) is huge. Exploitation of this market potential would depend on spread of awareness level of the environmentally friendly attribute of the material.

Demand from Elevators & Escalators

In elevators, SS sheet is used as interior finishing material – serving as a decorative material. Depending on the requirement, SS sheet with suitable finish is used inside elevators. All modern elevators used in residential, commercial, institutional and infrastructure buildings today use SS sheet for interior finishing. Hence, the growth in elevators & its usage is a direct barometer of increasing demand for SS decorative sheet from elevator manufacturers. Apart from elevator, SS sheet also finds usage in escalators which is extensively used in shopping malls, metro stations as well as airports.

Over the last few years, elevator sales in India is approximately 50,000 – 55,000 per annum, while the installed elevator base in the country is nearly 250,000 units per annum. As per OTIS India, India is the second largest elevator market in the world, after China, with residential real estate market accounting for nearly 80% of annual consumption accounted by residential market. Escalators, which is yet to become mainstream, is estimated to be a 3,500 – 4,000 units per annum market. The expansion in mall space, and growth in metro stations are driving the demand for escalators, and these two factors would be instrumental in pulling up the annual volume sales from the current levels.

This strong elevator demand is expected to translate into strong demand for SS decorative sheet, which has become an integral component of elevator. This strong demand for escalator manufacturers would be complimented by the rising demand for escalator market. Although annual volume of escalators sold in India is less than 10% of elevator sales, this segment has the potential to emerge as a strong secondary demand driver in this space.

Demand from commercial kitchens

Usage of SS sheet in kitchen stems from its inert & neutral attribute, making it an excellent antimicrobial material. It is this functional attribute, more than the decorative attribute, that has made SS sheet a preferred material of choice in kitchens. Moreover, its ability to hold original design & color as well as excellent anti scratch attributes too have helped SS sheet become a preferred material in kitchens (mainly commercial kitchens). In commercial kitchens, SS sheet is used in workstations, storage cabinets, exterior material for refrigerators, cooking range, and equipments like ovens & frying stations.

Commercial kitchen is directly linked to the restaurant industry, with an increase in restaurant base directly triggering fresh demand for commercial kitchen equipment. However, the popularity of hyperlocal food delivery services has created a new type of commercial kitchens – cloud kitchens. These cloud kitchens have emerged as the second demand driver in this industry, apart from the traditional restaurant business.

Apart from restaurants (and the newly emergent cloud kitchens), commercial kitchen equipment also finds application in QSR chains, bakeries, cafes, institutions, catering service providers, and industrial kitchens. All these segments together create demand for commercial kitchen ware, which in turn lead to higher consumption of SS sheet by manufacturers of commercial kitchenware.

Demand from Automotive, Railways & Transport (ART) Segment

SS sheet of varying finishes is used in the construction of metro coaches. For example, Jindal Stainless supplies SS sheet of 2J and No.4 finishes that are required for metro coaches. When the metro rail project was launched in India, coaches were imported. However, the expansion of metro rail projects to multiple cities has led global OEMs like Alstom and Bombardier to set up domestic manufacturing facilities, apart from domestic PSU BEML. Together these firms are the major consumers of SS sheets with specialized finishes.

As on end of Dec 2021, metro rail network is operational across 14 cities in India, with a cumulative railway track network of 74.5kms and about 551 metro stations. More than 2,500 metro coaches are in use today, servicing the metro network currently operational in India. Moreover, in the past three to four years, metro coach manufactures (BEML, Alstom, Bombardier and Titagarh) have together won tenders to supply more than 1,200 coaches¹² (metro coaches and Rapid Rail Transport System coaches).

With metro rail expected to become the pillar of urban transport infrastructure across all major cities, the demand for metro coaches is only going to increase. This planned expansion in metro network is thus a big position for SS sheet manufacturers.

¹² Government of India

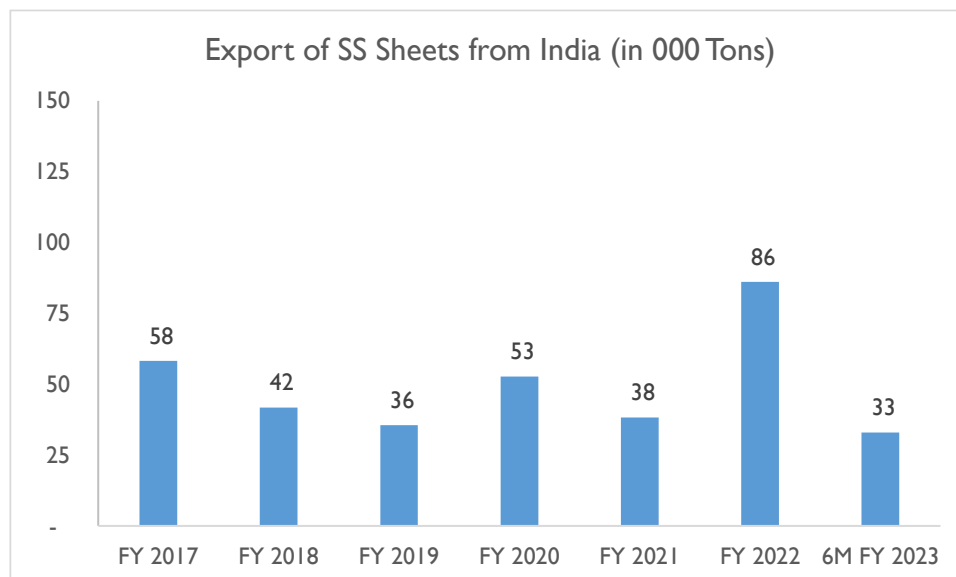
International Trade

Export Demand

Europe and the US form the largest export market for Indian SS sheet manufacturing industry, accounting for more than 85 - 90% of the total export volume. US alone accounts for nearly 30% of total import volumes, while in Europe the key export markets are Italy, Poland, Spain, Belgium, and Russia. Apart from stable demand from building construction and other allied structures, the presence of trade barriers against imports from China and other Asian destinations have worked to Indian SS sheet manufacturing industry.

Although India has built up its capacity in SS sheet manufacturing, it is not match to the excess capacity in markets like China, South Korea, and Japan. Further, Indian players are unable to match the price points at which SS sheet manufacturers operating out of China, South Korea and Japan sells. However, the strong sentiment prevailing against the above-mentioned markets, because of their dumping practices, most of the European countries and the US have imposed strong trade barriers. This includes high duty rates, as well as anti-dumping measures to discourage the dumping practice.

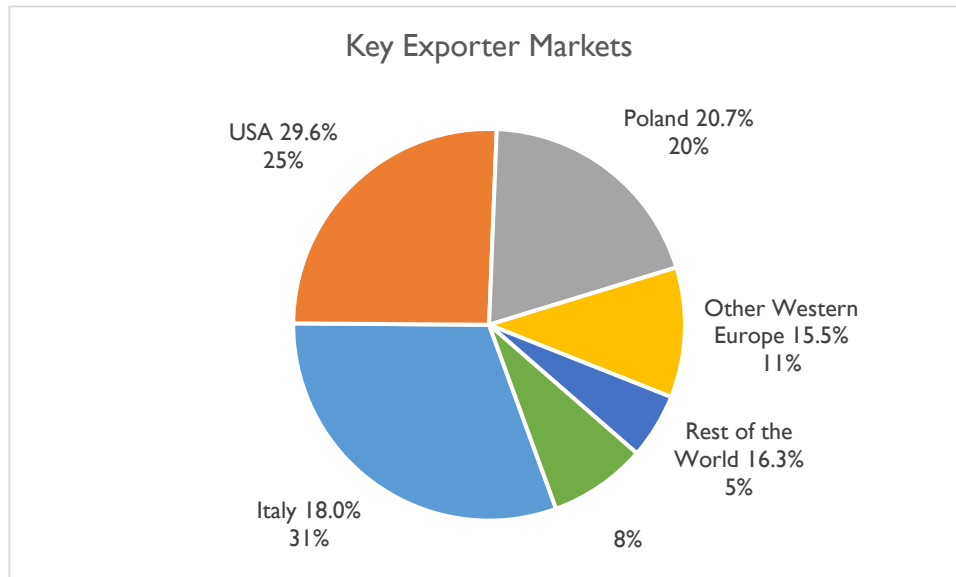
Given the lower manufacturing capacity in US and European market (because of the large-scale migration of manufacturing from West to developing markets), the anti-dumping and adverse trade measures have created a void. This gap has presented an opportunity for countries like India, who are now able to compete better in European and the US market. The domination of US and Europe in India's SS sheet export markets is a direct result of these developments.



Source: Directorate General of Foreign Trade, Ministry of Commerce

However, the concentration of exports on a handful of markets meant any fluctuation in exports to those markets would directly impact the overall export trend. In this case, exports to the US, Poland, and Italy

accounts for 65 – 70% of total annual export volume. Change in export volume to these markets meant overall export volume has shown a degree of fluctuation. For FY 2017-20 period, annual export volume has varied between 36 – 58 thousand tons. Export volume reached 86 thousand tons per annum in FY 2022, which is the highest in the past four to five years. During the first half of FY 2023, approximately 33 thousand tons of SS sheets were exported from India.



Source: Directorate General of Foreign Trade, Ministry of Commerce

Note: Geographical break-up based on April 2021-February 2022 import figures

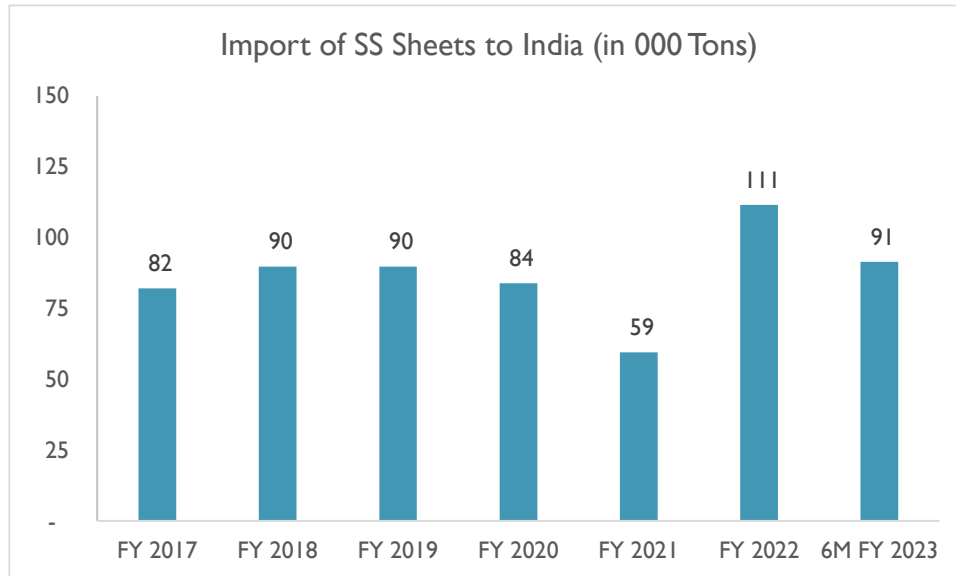
Imports to India

Despite the presence of a large steel manufacturing infrastructure – ranked second in the world, in terms of crude steel output – a substantial volume of SS sheet is imported to India every year. During FY 2017-20 period anywhere between 85 – 90 thousand tons of SS sheet was imported to India every year. Although Covid-19 disrupted the imports, pushing it down to 59 thousand tons per annum in FY 2021, it has rebounded in FY 2022.

For the full year FY 2022, 111 thousand tons of SS sheet was to be imported to India¹³. This marks the largest volume of imports in recent history. This 88% increase in import volume underscores the strong revival in demand, aided by resumption of construction and other end consuming industries.

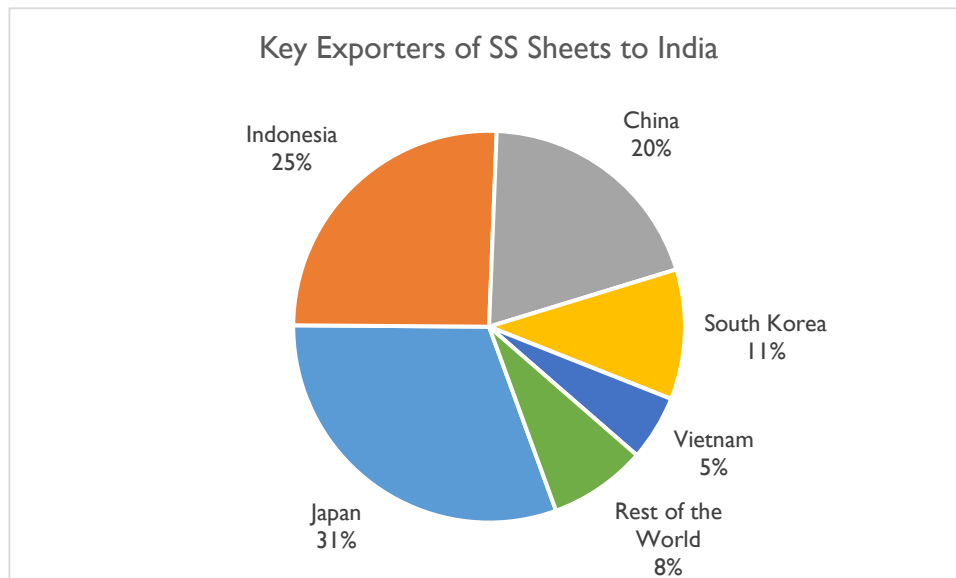
¹³ For FY 2022, the Ministry of Commerce has released data for only April 2021 – February 2022. Full value estimate based on 11 month figure

The near doubling of import volume in FY 2022 meant the country incurred an import bill of INR 17.4 Bn towards the import of SS sheet during the year. Discounting the slump in FY 2021, the average import bill on account of SS sheet imports has remained in the range of INR 10 Bn per annum (during FY 2017-20).



Source: Directorate General of Foreign Trade, Ministry of Commerce

Nearly 92% of SS sheets imported to India during April 2021-February 2022 came from five markets, namely Japan, South Korea, China, Indonesia, and Vietnam. Of these, Japan is the largest exporter of the commodity, accounting for nearly 31% of total import volume during April 2021-February 2022 period.



Source: Directorate General of Foreign Trade, Ministry of Commerce,

Note: Geographical break-up based on April 2021-February 2022 import figures

The excessive stainless-steel capacity in markets like Japan, South Korea, China, and Indonesia together with surging demand for SS products in India has resulted in unbridled import of these products to India. Backed by favorable trade measures & agreements, these low-cost manufacturing destinations have stepped up imports to India, in the process creating material injury to domestic industry. As per Indian Stainless Steel Development Association (ISSDA), imports today account for nearly 20% of domestic SS market. This scenario is playing across a wide range of stainless-steel products, including flat products.

In response to the complaints by domestic SS sheet & flat product manufacturers, about the harm caused by dumping of SS flats, the Directorate General of Trade Remedies (DGTR) initiated an investigation. Based on this probe, DGTR recommended imposing anti-dumping duties on SS flat products imported from markets like China, Japan, and South Korea, among others. However, the Government have rejected the recommendation and have decided not to impose any anti-dumping duty on the import of SS flats.

This measure by the Union Government meant domestic industry would continue to face stiff competition from lower priced imports. Availability of lower cost imports together with lower demand (lower than pre-covid levels) has impacted the revenue growth as well as profitability in the domestic industry.

Competitive Landscape

SS sheet manufacturing in India is a fragmented industry, with a domination of small & medium sized players who make up the unorganized segment. Ease of raw material availability, production process which is not protected by any intellectual property restrictions, and low switching cost have all resulted in low entry barriers. Meanwhile, the ubiquitous usage of SS sheet (across a wide variety of sectors) meant there is a steady demand for the commodity.

These two factors (steady demand & low entry barriers) have made the industry an attractive bet for smaller players. In addition, the lack of product differentiation and fragmented customer base has ensured that smaller players would be successful in finding a market for their products.

However, the recent developments – mostly in product offerings – is reshaping the industry, creating a space for specialized players. Technology advances in SS sheet finishing in the recent years – in response to market demand – have created a new line of product. As SS sheet is finding usage as an exterior cladding material, the demand for matte, brushed, satin and mirror finish has increased. This has created the need for specialized technology for imparting the aforementioned finishes. Capital investment required to upgrade manufacturing capability to produce these finishes is acting as an entry barrier. Smaller firms, catering to smaller customers at a localized market would find it hard to make the necessary investment.

SS sheets with specialized finishes is become a differentiating factor in building construction, and its demand is expected to increase in the coming years. SS sheet manufacturers who have developed the capability to manufacture these finishes has the opportunity to establish a market superiority vis-à-vis smaller players.

Apart from domestic manufacturers, the industry also comprises of a large number of traders / suppliers dealing in imported SS finishing sheets. Given the large volume of SS sheet imported to India, this segment plays a considerable role in shaping the competition in this sector.

At present, product price is the predominant factor considered by customers in choosing SS sheet vendors. Presence of low-cost imports have driven down the prices, impacting the profit margins of both large and small manufacturers. The anticipated change in market, towards sheets with specialized finishes could introduce product differentiation and with it the prospect of a range of premium priced sheets. Although the threat from imports would remain, the capability to supply a wide range of specialized finishes as well as the ability to develop new products as per customer / market specification could act as entry barriers. Established players who has invested in strengthening their product portfolio as well as R&D capability stands to reap the benefit.

This differentiation is most visible in metro coach manufacturing industry. Metro coach manufacturing in India is concentrated among three to four players, who by default forms the entire customer base for SS sheet

specifically designed for use in metro coaches. This consolidated industry structure in metro coach manufacturing sector leaves little negotiating room for SS sheet suppliers, limiting their pricing power. On the other hand, the volume of SS sheet procured by these coach manufacturers is very high, which cannot be met by smaller players. The same is true in terms of product quality too, where specialized finishes are demanded. Hence, SS sheet manufacturers with large capacity & a wide product portfolio (with varying finishes) has an advantage, compared to smaller players.

Notable SS Sheet Manufacturers in India	
Panchdeep Metal Corporation	Panchdeep Metal Corporation, based in Mumbai is a leading manufacturer of a variety of SS products, including sheets, rods, pipes, rounds, flats, and coils. The Company services customers in petrochemicals, cement, automobile, oil & gas, and process industry. They are also a supplier to railway industry – for manufacturing of coaches and other components.
Ratnaveer Precision Engineering Limited	Ratnaveer, established in 2000, is a leading manufacturer of SS sheets, washers, hooks, and SS tubes & pipes. The Company's SS sheet product portfolio comprise of a wide range of finishing sheets.
Jyoti Steel India	Jyoti Steel, established in 2010 manufactures SS sheets, metal fasteners, duplex & super duplex steel products. The Company's SS sheet portfolio comprise of Square SS sheet, and SS sheets of variants 316L and 309.
Jindal Stainless Steelway Limited (JSSL)	JSSL is part of Jindal Stainless (India's leading stainless-steel manufacturer). JSSL manufactures and supplies a wide range of stainless steel flat products, including polished sheets to coil products.

Growth Outlook

SS sheet usage has seen a significant growth in the past decade, on the back of novel application in ABC segment as well as emergence of new customer segments like metro railways.

Usage of steel in architecture & building construction was mostly confined to load bearing & structural applications. Usage of specialized products like SS sheet was relatively low. Changes in building design & construction technics have ushered in a change, paving the way for the adoption of SS sheets. While usage of SS sheet as roofing and cladding material has found a ready audience, its usage as a decorative sheet is yet to gain traction.

On the other hand, the growth in metro rail network has presented SS sheet manufacturers with a new customer segment. Given the rapid growth in metro network in the country, this new segment has turned out to be a key demand driver. These two customer segments would continue to be the major demand drivers for this product in the years to come.

Expected growth in demand from ABC segment

One notable difference would be the increase in product penetration. As the practice of using SS sheet for decorative cladding picks up, the volume of SS sheet consumed by architecture & building construction segment would significantly increase. In addition, the demand would diversify from low value SS sheet to high value SS sheets with specialized finishes. This later development (increase in premium specialized products) would also ensure a strong growth in annual turnover. Apart from this increase in consumption volume due to increase in usage areas, the general growth in office space and retail space would support the future growth in demand.

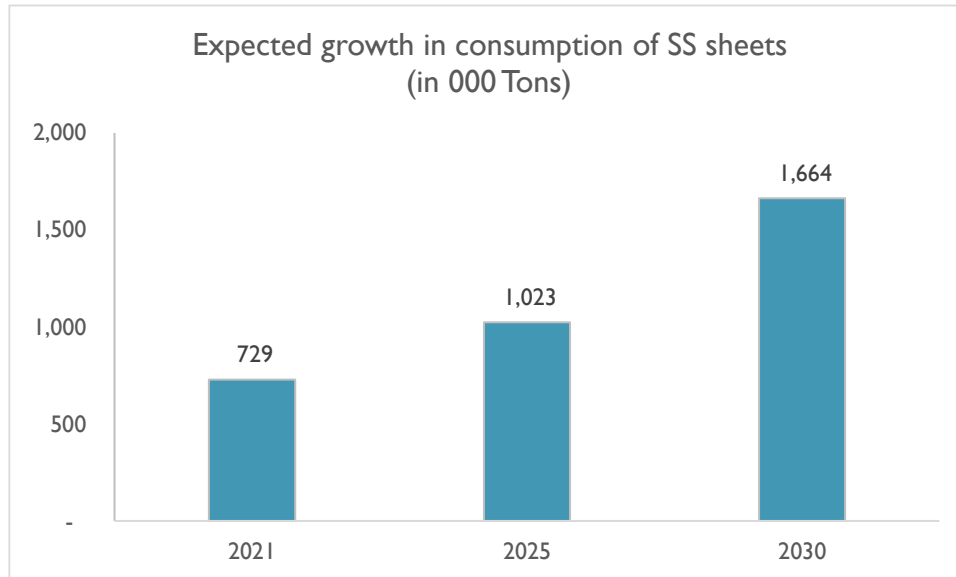
Expected growth in demand from ART segment

Aggressive expansion of metro rail projects coupled with expansion of existing network would create higher demand for metro coaches. This in turn would ensure higher demand for SS sheet from metro coach manufacturers. Unlike ABC segment, the bargaining power of buyers is high, due to the limited number of buyers. There are only 3 – 4 metro coach manufacturers operating in the country, and SS sheet procurement by these OEMs would be skewed towards established players. This bias is primarily due to the higher production capacity, as well as ability to manufacture a wide variety of SS sheet finishes. Hence larger players have an advantage over their smaller peers.

Thus, the overall demand for SS sheet would continue to remain strong in the coming years. However, the resultant impact on SS sheet manufactures would be different. Smaller players would be better equipped to capitalize on increased demand from ABC segment. Meanwhile

the same set of players would find it challenging to cater to the expected demand from specialized customer segments like metro coach manufacturers.

On the back of the higher demand expected from ART and ABC segment, as well as from other segments like process industry & kitchen ware, the annual consumption of SS sheet is expected to reach 1,020 thousand tons in 2025, and further increasing to 1,660 thousand tons by 2030.



Dun & Bradstreet Research

SS Washers

A typical washer is a disk-shaped small thin plate that has a hole in the center. There are numerous uses of washers, however it mainly serves as a spacer to absorb a shock and evenly distribute load of a fastener. Washers can also prevent leakage or corrosion, relieve friction, and maintain tension. The size of the hole in the middle of a washer is typically based on the clearance value of the fastener it will be used along with.

Washers are usually metal or plastic and are made in different sizes based on their application. They are made from a variety of materials including stainless steel, carbon steel, zinc, copper, brass, plastic, rubber, fiber, and ceramic. Stainless steel (SS) washers and galvanized carbon steel washers are the most commonly used. While the former offers better strength, the superior corrosion resistance attribute of stainless steel gives it an edge.

Stainless Steel (SS) washers

Stainless steel washers are most used washers applied in fastener assemblies to distribute load from a bolt's top across a wider surface area. Globally, stainless steel washer is a preferred choice for the end-users of washers owing to its numerous positive properties. The notable advantage of stainless steel over other metals is its natural characteristics such as resistance from corrosion and rust, and thus, is most preferred input material for manufacturing washers. Another advantage of SS washer is that they make maintenance tasks much easier, as their load-bearing quality makes the tightening and/or loosening of components hassle-free.

Stainless steel washers are made by the stamping process that uses a die to punch a shape or a form from a flat sheet of stainless steel. Stamping is a fast and smooth process that is capable of manufacturing large number of washers and enables maximum use of metal sheets. Generally, all washer manufacturers attempt to follow standards for manufacturing published by **International Organization for Standardization (ISO)**, in order to maintain the quality of their products and prevention of harm to the environment.

Type of washers

There are mainly three types of washers based on their features and application: **plain washers**, **lock washers**, and **spring washers**. Within each of these types, there are more specialized forms that serve unique purposes.

Plain Washers

Plain washers are the most common type of washers. They distribute the load and protect the object to which the nut or screw is fastened. Moreover, a plain washer can also be used to correct the size difference if the hole is of a larger diameter than the fastener. Plain washers include various other specialized forms that are made for specific purposes. Few of the popular specialized types of plain washers include:

- (i) **Flat washers:** These are flat and circular in shape with a middle hole to accommodate a bolt. The thickness varies according to their application. Flat washers are used for general purposes to distribute pressure or correct size differences of hole.
- (ii) **C-washers:** A C-washer is used where a washer might need to be removed, replaced, or adjusted without removing the fastener. It is similar to a flat washer, but it has a slot cut from the middle hole to form a 'C' shape.
- (iii) **Fender washers:** Fender washers are flat washers with a small hole and relatively large outside diameter. They are commonly used with car fasteners to distribute load over a large surface area.
- (iv) **Countersunk / Finishing washers:** A finishing washer is a type of washer that has a sunken top which helps to catch the fastener. They create a flush surface when secured with countersunk nuts or screws.
- (v) **Torque washers:** A torque washer is similar to flat washer but has a square hole in the middle. It has outer prongs that prevent the bolt from spinning while fastening an object. It is mainly used with a carriage bolt for woodworking.

Lock Washers

Due to various reasons, fasteners carry chances of rotating or disassembling from the assembly. Lock washers secure fasteners from rotating or losing friction. Lock washers are made in different types but all of them work under same principle i.e., they exert a continuous pressure by partially deforming and secures a fastener from loosening. The main types of lock washers include:

- (i) **Split lock washers:** Also known as helical lock washers, split lock washer is a non-continuous circular washer with its designed to bend outwards in opposite directions of each other. When a screw is tightened, split lock washers flatten to add tension to the bolt head against the mating surface to prevent loosening.
- (ii) **External tooth lock washers:** These washers have small prongs along the outside diameter and cylindrical inner diameter. The little prongs are a slightly bent and when the nut is put and tightened on washer, nut gets locked on those prongs. This type of washers is used to lock a fastener into place.
- (iii) **Internal tooth lock washers:** These washers have several little prongs on the inside diameter that bite into the fastener and plain surface on outside diameter. Internal tooth lock washers work well with screws with smaller heads. They are mainly used to lock small-headed fasteners into place.

Spring Washers

Spring washers are metal discs made into an irregular shape to subject the washer to compress under the pressure like a compression spring. They have axial flexibility that enables them to move with vibrations and

thus prevent object from unfastening or loosening. The structure of the washers provides preload between joining surfaces. The specialized forms of spring washers include:

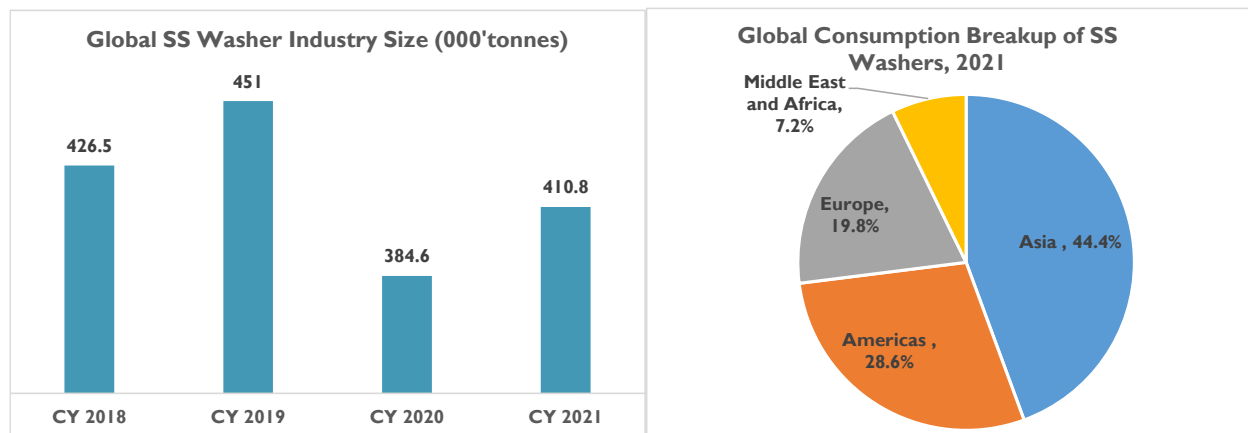
- (i) **Crescent washers:** They are also known as curved washers. Crescent washers look like flat washers that are slightly curved for exerting light pressure and maintaining flexibility. They are mainly used to absorb movement.
- (ii) **Belleville / Conical washers:** These washers have beveled sides and are more like springs than washers. The spring-like properties enable washer to support heavy load with small deflections. They are mainly used in projects that involve thermal expansion.
- (iii) **Dome washers:** These washers look similar to belleville washer but have rounded sides. They can be used wherever crescent spring are used but need to create a flatter surface.
- (iv) **Wave washers:** Wave washers are shaped like a wave and are curved in two directions. This wave-like shape offers moderate pressure capacity and deflection. These washers are used most often as spacers or cushions.
- (v) **Finger spring washers:** Also known as finger disc springs, these washers have curved/bent flanges around the circumference that provide additional spring like qualities. They are used for dampening vibrations and noise.

Apart from these three most widely used types of washers, other types include specialty washers that serve unique and unusual purposes than the traditional washers. They are usually in irregular shape. Such specialty washers may include **square washers** which are used with square-headed bolts and offer a bigger surface than the circular washers, **multiple hole washers** that have more than one continuous hole in order to avoid applying several washers, and other customized washers.

Global Consumption Scenario

SS washer, although a low value product, but is a critical component and are widely used in multiple manufacturing industries, utility sector, infrastructure, and real estate construction, amongst other. Backed by its diversified application, the global consumption of SS washers before falling in 2020 observed a healthy growth of 5.7% in 2019. The global consumption contracted in 2020 by nearly 15% on yearly basis to 384.6 thousand tonnes on the back of Covid-19 induced disruption in economic activity. However, the market demand recovered, and global SS washer consumption registered 6.8% y-o-y growth as industries resumed operation when lockdown and Covid-19 related restriction were relaxed gradually.

In value terms, the revenue from SS washers was estimated to value at ~USD 2,960 in 2021, registering a CAGR of 1.3% between 2018-21. Supported by favorable product attributes, the demand for SS washer is driven by rapid urbanization which has accelerated the pace of the infrastructure developments, real estate construction and industrial production. In line with contraction consumption volume in 2020, the SS washer market in value terms observed y-o-y decline of 13.7% on year basis but with recovering demand from end user's industry, the global SS washers expanded by 12.9% in 2021.



Sources: Based on inputs from a primary Survey

Geographically, Asia emerged as the fastest growing region as well as the largest consumer of SS washer in 2021. Asia's SS washers consumption grew at CAGR of nearly 29% while consumption in other region such as Americas, Europe, and Middle East & Africa contracted at CAGR of 2.2%, 0.8% and 2%, respectively. Contracting global GDP growth in 2020 led to a fall in consumption demand for SS washers in all the four regions as industrial activity in major end user industries such as automobile and other manufacturing industries, infrastructure, and construction was impacted due to Covid-19 led disruption. However, recovering global GDP led by resumption in economic activity across many major sectors supported the SS washer consumption growth in 2021 across all the regions.

Geography-wise SS washers Consumption Volume (Growth trend)

Regions	2020	2021	CAGR 2018-21
Asia	-13.9%	7.8%	29.1%
Europe	-15.6%	5.7%	-2.2%
Middle East & Africa	-14.3%	7.2%	-0.8%
Americas	-15.5%	6.0%	-2.0%

Sources: Based on inputs from a primary Survey

Production Scenario

On supply side, the global production of SS washer was estimated at ~489 thousand tonnes valuing USD 3,520 Mn in 2021 with nearly 70% of production concentrated in Asia region followed by America, Europe, and Middle East & Africa region accounting for respective share of 15.6%, ~13% and 2.6%. In terms of consumption and production, the global SS washer industry had a production surplus of 78 thousand tonnes where Asia with China being a global manufacturing hub emerged as a production surplus region while other region remained a consumption surplus region. Below table represent region wise demand supply gap situation:

SS Washers Volume in '000 Tonnes in 2021

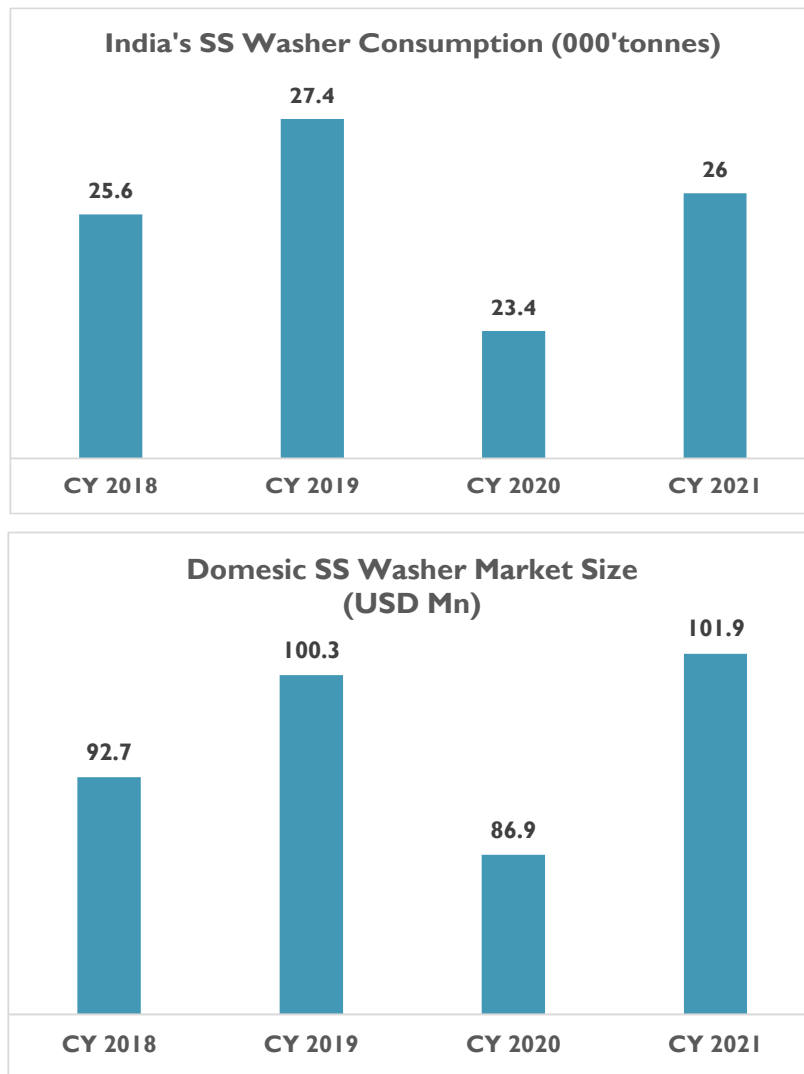
Region	Production	Consumption	Demand Supply Gap
Asia	336.8	182.4	-154.4
Europe	63.1	81.3	18.2
Middle East and Africa	12.7	29.6	16.9
Americas	76.3	117.5	41.2

Sources: Based on inputs from a primary Survey

Indian Consumption Scenario

Annual SS washer consumption in India is estimated to have recovered in 2021 to 26 thousand tones from the record decline in 2020, however its consumption volume continued to remain lower than the pre-pandemic level. Between 2018-21, India's SS washer consumption is estimated to have grown at a flat CAGR of 0.5%. Barring a record decline in 2020 due to Covid-19 pandemic induced depressed market sentiment, the domestic consumption of SS washers registered healthy yearly growth of 7% in 2019 when the domestic consumption touched 27.4 thousand tonnes.

In 2021, the country's SS washers consumption registered 11% y-o-y growth. Rising consumption in 2021 is backed by resuming demand recovery in the major end user industries. Incremental demand originating from automobile particularly EV segment, infrastructure and real estate construction, water transportation mainly driven by Jal Jeevan Mission, industrial application, and sharp push to green energy sector especially solar energy has supported the growth of SS washers industry.



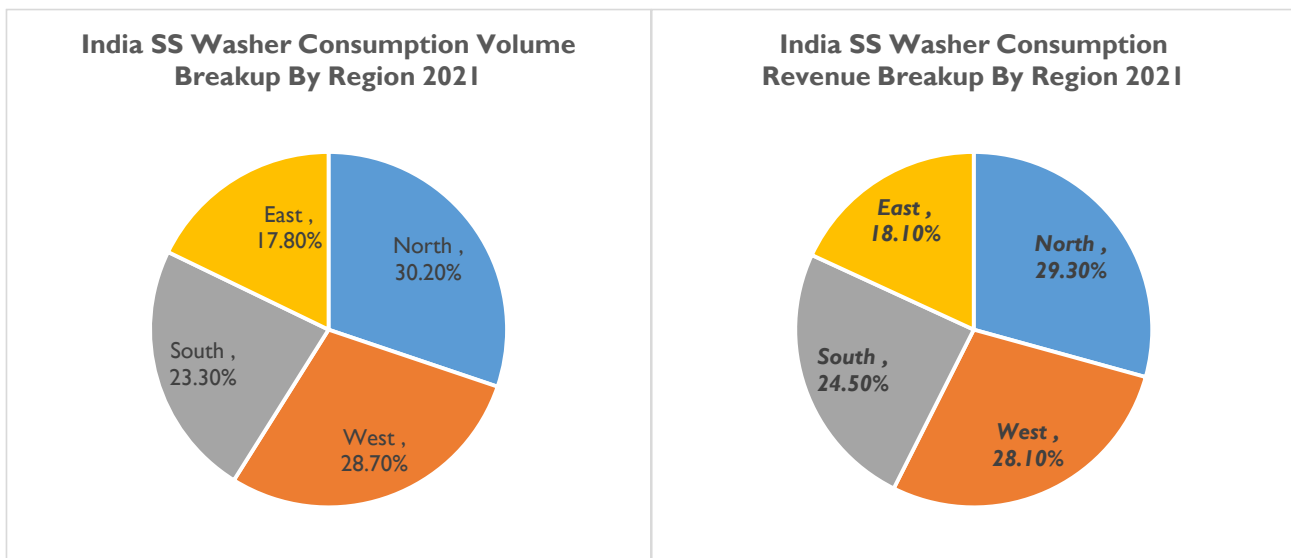
Sources: Based on inputs from a primary Survey

In value term, the domestic consumption of SS washers is estimated to have grown at 3.2% CAGR between 2018-21 to reach USD 102 Bn in 2021. Annually, the domestic consumption in value term estimated to have registered 13.2% decline in 2020 in line with falling demand. In 2020, the outbreak of Covid-19 in 2020 had a negative impact on the India SS Washers market owing to the lockdown and subsequent supply chain

disruptions, along with delays in production processes. However, the market recovered in 2021 with the gradual resumption of manufacturing and economic activities and registered yearly growth of 11%.

Regional Breakup

Northern region closely followed by western region have garnered majority share both in terms of consumption volume and value on account of its large population and presence of industries. Gurugram and Manesar in Haryana have the largest automotive manufacturing industry of Maruti Suzuki coupled with Noida and Gurugram as the major corporate hubs in the northern region with the greatest number of office space have support the demand for SS washers.



Sources: Based on inputs from a primary Survey

In western region, rapidly growing construction and industrial sector in Gujarat and Maharashtra coupled with highest foreign direct investment inflow in these states in 2020-2021 where Gujarat accounted for about 37% of the country’s total FDI followed by Maharashtra accounting for about 27%. Moreover, Gujarat and Maharashtra are the states with largest number of manufacturing and automotive industries in the country which supports high share of western region in the SS washer’s consumption.

India Production Scenario

India’s annual production volume was estimated at 31.3 thousand tons with production turnover valuing at USD 122.6 Mn in 2021. The government initiatives like “Make in India”, Atma Nirbhar Bharat and “Production Linked Incentive” scheme are significantly supporting the market growth. These scheme aims to enhance skill development and create best infrastructure in India and push the industrial sector across the country.

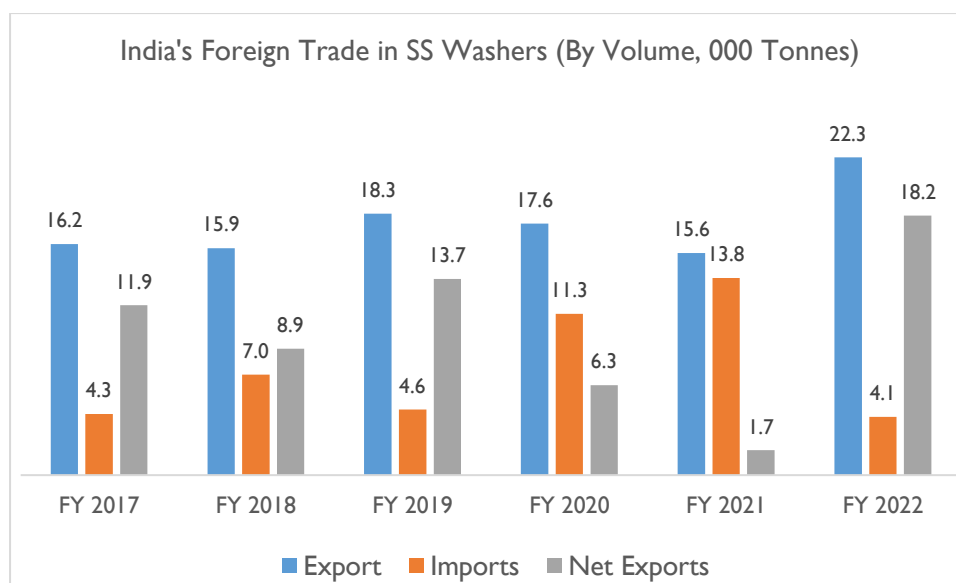
Furthermore, the government is focused to make India a manufacturing hub and towards this, the government is developing industrial corridors spread across the country.

In terms over industrial park penetration, **Maharashtra leads the other states with having presence of 728 industrial parks** followed by **Karnataka, Andhra Pradesh, and Rajasthan with 539, 400 and 370 industrial parks, respectively**. Growing development of industrial plant is expected to support the domestic consumption of SS washer. It will also help the industry to evolve as a leading producer and export of SS washers in the world.

Foreign Trade

Trade Volume

In terms of volume, India remained a net exporter of SS washers during the period FY 2017-22, with annual export volume increasing from 16.20 thousand tonnes in FY 2017 to 22.28 thousand tonnes in FY 2022, registering a CAGR of 6.6% during the period. After witnessing a 12% decline in FY 2021 amidst weak global demand owing to Covid-19 induced depressed market sentiment, SS washer export volume observed healthy y-o-y growth of 43.1% in FY 2022. Recovering end-user demand from major export partners are likely to support this growth.

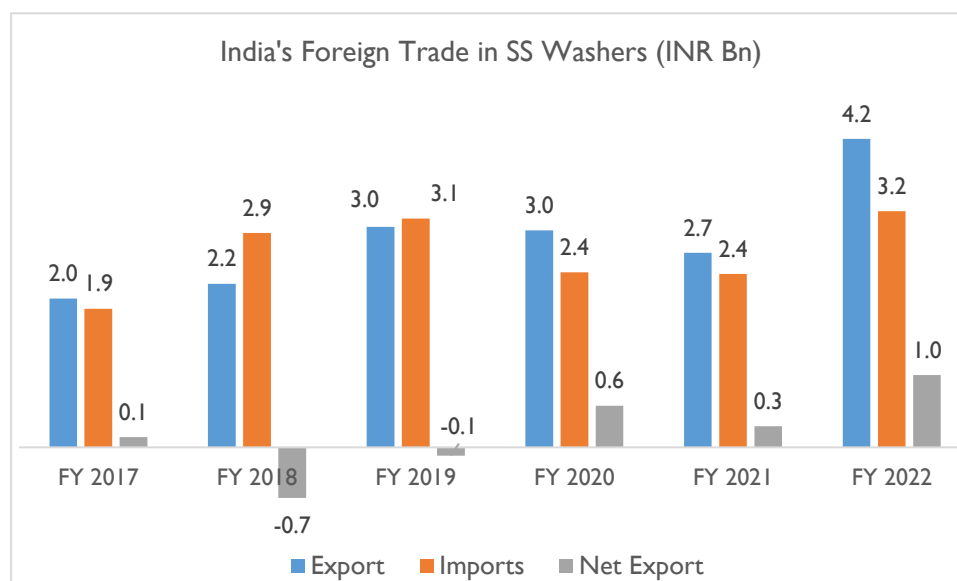


Source: Ministry of Commerce & Industry, Trade Statistics

During FY 2017-22, India's SS washer imports are estimated to have declined by a CAGR of 1% in terms of volume. However, on y-o-y basis, annual imports are estimated to observe a sharp decline of nearly 70% in FY 2022. This decline in import can be attributed to expanding domestic manufacturing which has accelerated the export volume and translated in declining import volume. Accordingly, the net trade volume (net export) of SS washers has increased at CAGR of 8.8%.

Trade Value

In terms of value, India remained a net exporter of SS washers in FY 2022. India's export revenue from SS washers grew at a CAGR of 15.7% while its import bill grew at a CAGR of 11.2% during FY 2017-22. In absolute terms, the export value reached INR 4.2 billion whereas import bill reached INR 3.2 billion in FY 2022. On y-o-y basis, the country's SS washers export revenue grew by 58.7% against 10% decline in the previous year. On the other hand, import bill increased by 36.2% y-o-y in FY 2022 against 1% decline in previous year. India's net trade position exhibited mixed trend owing to the impact of foreign exchange volatility.



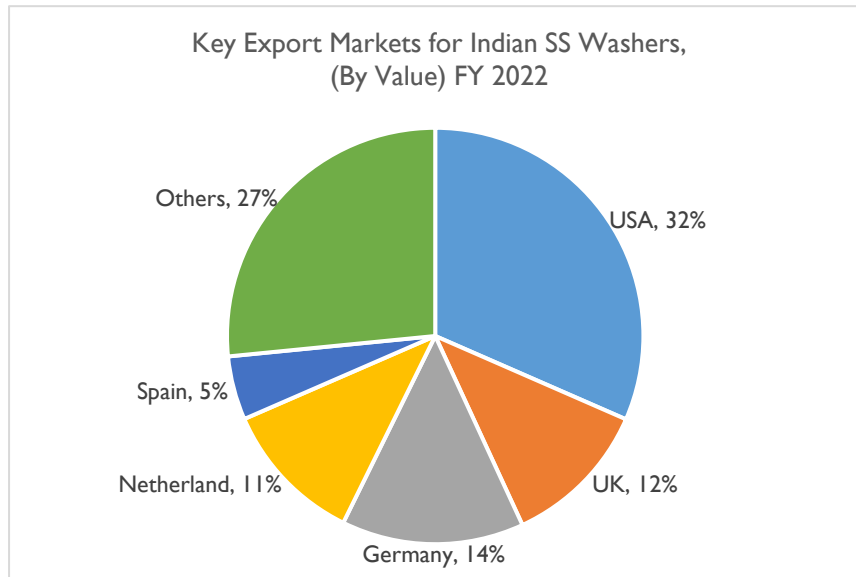
Source: Ministry of Commerce & Industry, Trade Statistics

In FY 2022, even with falling import volume, the SS washers import bill grew by 36.2% which can be attributed to depreciating rupee value translating in higher landing cost of imports. On a contrary, the import volume surged in FY 2021 by 22% but import bill decreased by 1% which can be attributed to appreciating rupee value during the year. In FY 2022, rupee depreciated by 3.5% against dollar against 3.4% gain in the previous year.

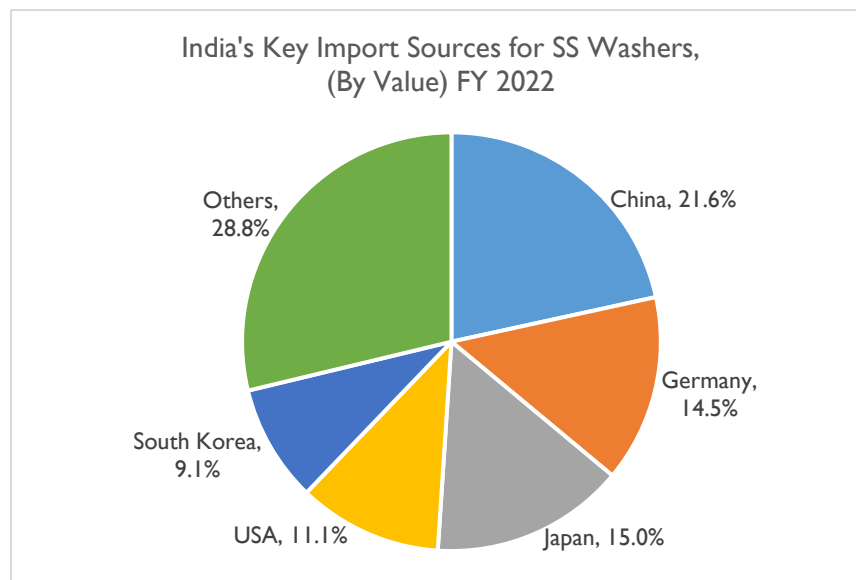
Major Trading Partners

India's export market for SS washers is diversified with the country exporting SS washer to nearly 155 nations. In FY 2022, USA continued to remain India's largest export market with 31.6% share in the total SS washer exports. Export of SS washers to the US market has steadily grown at a CAGR of nearly 33% during FY 2018-22 to reach the value of INR 1.33 billion from the level of INR 0.37 billion in FY 2018. As a result, the share of USA in India's SS washer export has increased from 17% to 31%.

Germany, UK, Netherland, and Spain were the other major export markets for SS washers in FY 2022. However, UK's share in India's SS washer exports has gradually declined from 19.5% in FY 2018 to 11.6% in FY 2022. Together, these top five countries accounted for nearly 2/3rd of the total SS washers' exports in FY 2022.



Source: Ministry of Commerce & Industry, Trade Statistics



Source: Ministry of Commerce & Industry, Trade Statistics

For Imports, China's has emerged as the largest import source of SS washers for India followed by Japan and Germany in FY 2022. Previously, South Korea and Japan were India's largest import sources in FY 2018 (19.24% in SS washer imports to India), but gradually it has lost its share to other major markets such as China and Germany.

China's share in SS washer import to India has increased from 8.8% in FY 2018 to 21.6% in FY 2022. In absolute terms, its import to India has increased at a CAGR of nearly 26% during FY 2018-22 to reach INR 699 million in FY 2022. During the last two years, Japan has emerged as the second largest import source of SS washers for India with the share of nearly 15% in total imports to India. Similarly, Germany's share in India's total SS washer imports has increased from 10.2% in FY 2018 to 14.5% in FY 2022, growing at a CAGR of nearly 9% to reach INR 468.7 million from INR 299.9 million in FY 2018.

Indian Government, in a notification dated 7 September 2017, communicated the imposing of counter veiling duty (CVD) on import of stainless-steel hot rolled and cold rolled products from China, for a period of five years. This was culmination of an enquiry by the Directorate General of Anti-Dumping and Allied Duties, in response to an increase in import of low / subsidized price SS flats from China. Although the measure focuses on import of SS tubes & pipes, it can be construed as an indication of the Government to protect the domestic steel industry, against cheap imports.

The CVD investigations were initiated on 12th April 2016 by the Directorate General of Anti-Dumping and Allied Duties (DGAD) in response to a surge in subsidized imports of stainless-steel flat products. These imports were distorting the domestic market, which was under huge stress and was leading to financial stress in the industry. Extensive investigations were carried out by DGAD and the final findings were issued by the DGAD vide notification dated 4th July 2017.

Following are the details of the duty imposed:

Heading	Description of Goods	Country of Origin	Country of Export	Producer	Exporter	Duty as % of Landed Value
7219 or 7220	Flat-rolled products of stainless steel*	China PR	China PR	Any	Any	18.95%

**Flat-rolled products of stainless steel, whether hot rolled or cold rolled of all grades/series; whether or not in plates, sheets, or in coil form or in any shape, of any width, of thickness 1.2 mm to 10.5 mm in case of hot rolled coils; 3 mm to 105 mm in case of hot rolled plates & sheets; and up to 6.75 mm in case of cold rolled flat products. Product scope specifically excludes razor blade grade steel.*

Prior to this, the anti-dumping duty was already in place on:

- Hot-rolled austenitic stainless steel flat products; whether or not plates, sheets or coils (hot-rolled annealed and pickled or black) of rectangular shape; of grade either ASTM 304 or 304H or 304L or 304N or 304LN or EN 1.4311, EN 1.4301, EN 1.4307 or X5CRN11810 or X04Cr19Ni9, or equivalents thereof in any other standards such as UNS, DIN, JIS, BIS, EN, etc.; whether or not with number one

or black finish; whether or not of quality prime or non-prime; whether or not of edge condition with mill edge or trim edge; of thickness in the range of 1.2mm to 10.5mm in Coils and 3mm to 105mm in Plates and Sheets; of all widths up to 1650 mm (width tolerance of +20mm for mill edge and +5mm for trim edge). (*Custom Notification No. 28/2015- Customs (ADD) dated 05/06/2015*).

- Cold-rolled flat products of Stainless Steel of width of 600 mm up to 1250 mm of all series not further worked than cold-rolled (cold-reduced) with a thickness of up to 4 mm (width tolerance of +30 mm for mill edged and +4 mm for trimmed edged)

The sunset review of above investigation was initiated on 8th October 2021. The Authority called for responses from all interested parties including importers and exporters. In the notification dated, 21st December 2022, additional time till 29th December 2022, had been granted to all interested parties¹⁴.

Key Demand Drivers

Washers are primarily used as spacer to absorb a shock and evenly distribute load of a threaded fastener. The versatile applications of washers along with various engineering products such as nuts, bolts, and fasteners used in almost every industry has supported the demand for washers. Amongst several type of washers available, washers made from SS steel are the most widely used material in washers. These are widely used in automobile industry, residential, commercial and infrastructure construction and in several other manufacturing and utility sector. SS washers with having better corrosion and chemical resistance are commonly used in a salty environment like saltwater, chlorine, coastal area. In industrial sector, SS washer thus find diversified application specialty chemical, petrochemical, power, industry. sea water equipment, and many other engineering applications.

A brief overview and outlook of leading end user industries for SS washer is presented below to gauge the evolving demand scenario of SS washers in India.

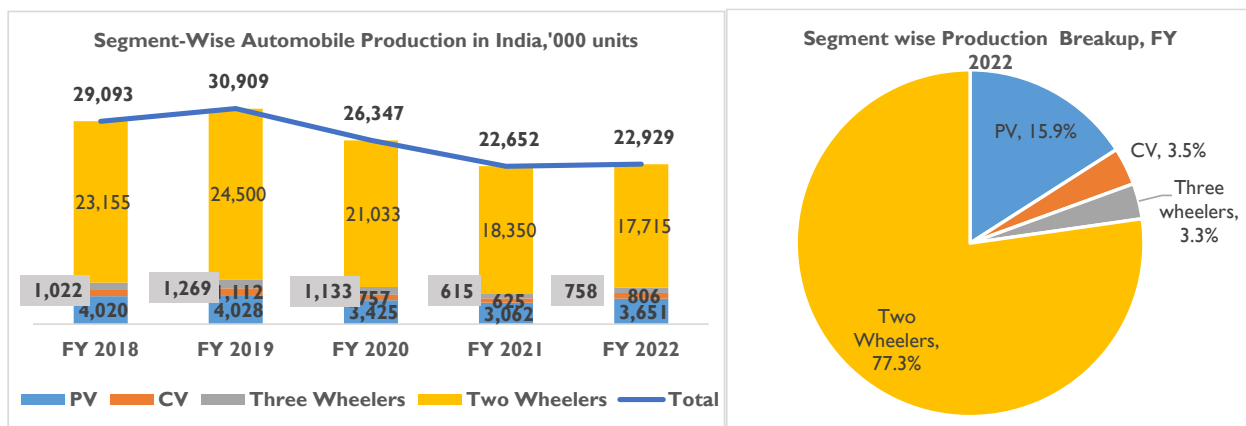
Automobile Industry

Auto and auto component manufacturing is a key economic sector, contributing to nearly 2.3% to the nation's Gross Domestic Product (GDP), 25% to the national manufacturing GDP, and 4% to overall annual exports. The sector employs nearly 5 million people, underlining its importance to the industrial sector. Development in the automobile sector has strong backward and forward linkages. It governs the fortune of several industries in manufacturing segments including iron & steel and its allied metal product like SS washer.

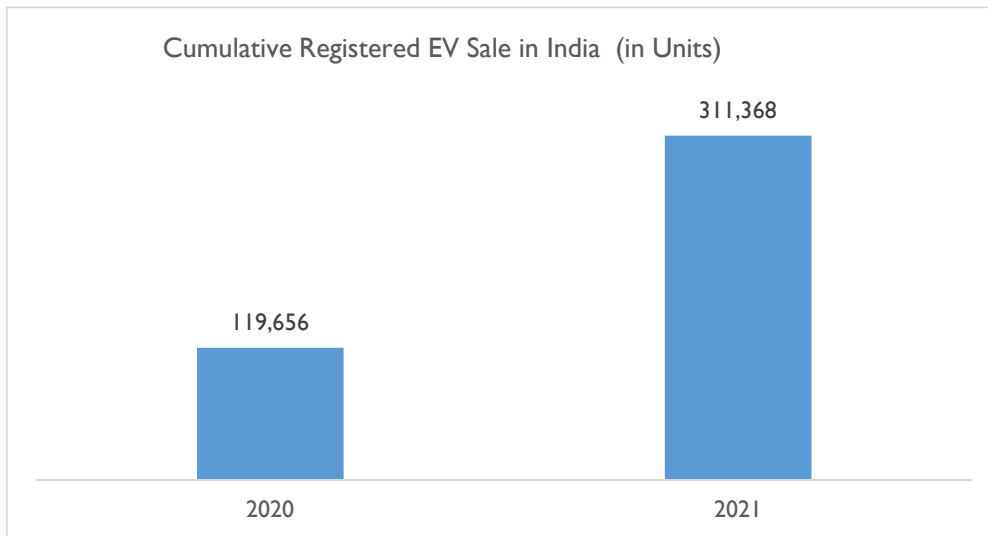
The rise in automobile production and sale in India over the last couple of decades have translated into positive demand for SS washers in automobiles. Apart from the natural growth in demand due to rise in

¹⁴ Directorate General of Anti-Dumping and Allied Duties have not updated the status post 29th December 2022

automobile production, the regulatory changes that is happening across global automobile industry too have positive implication on increasing usage of stainless steel in the sector. The industry associations are pushing for a sustainable development of domestic automobile industry and aims to evolve India a global destination of choice for design and manufacturing hub of automobile. Thus, industry stakeholders are proactively working to enhance the competitiveness of the domestic automobile industry by reducing cost of vehicles, increasing productivity, and achieving global standards of quality. The stringent norms and efficiency standards are thus forcing automobile manufacturers to increase the proportion of special stainless steel used in vehicles. The high strength to weight ratio, high durability, tolerance, and good corrosion resistance attributes have also contributed to an increasing usage of stainless steel in automobiles.



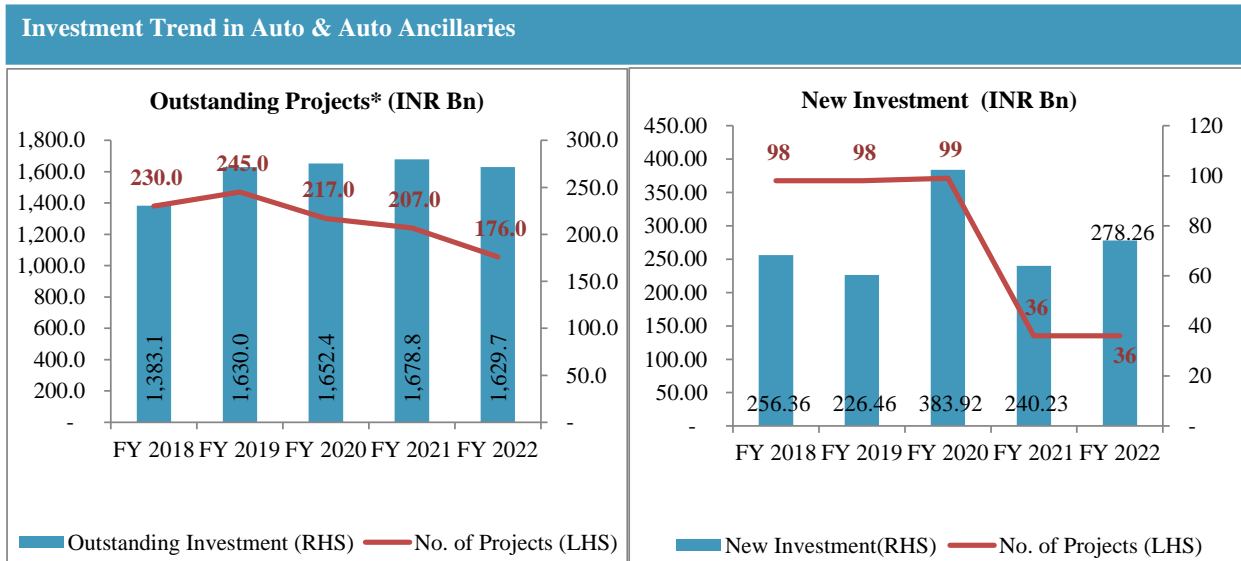
The overall domestic production surged to 30.9 Mn units in FY 2019 before plummeting for two consecutive year in FY 2020-21. The COVID-19 pandemic worsened the vehicle demand in FY 2021 as industry lost 2 months in FY 2021 because of Government enforced lockdown. During FY 2022, the overall industry production of ICE-based vehicle registered flat growth of just 0.01% on account of 3% decline in two-wheeler segment which impacted the overall production volume while domestic sales in other segments recovered.



Sources: Dun & Bradstreet Desk Research

On contrary, the moderating production volume in overall ICE based vehicle is compensated by shift towards EV in India. During Jan-Dec 2021, cumulative EV sales in India touched 311,368 units which was 160% higher compared to the corresponding period last year. NITI Ayog, has revealed its plan of achieving 100% electrification target in two-wheeler space by 2026, for which the agency is working in partnership with private sector. Given the track record of EV sales in India, chances of achieving these targets by 2030 looks slim. Since then, the Government has scaled down this 100% electrification target to 30%, on the face of resistance from automobile industry players. If India achieves the 30% electrification target by 2030, that will result in Indian EV stock crossing 100 million units. To achieve this goal, it is estimated that nearly USD 190 – 200 Bn of investment is required across vehicle manufacturing, charging infrastructure, and battery manufacturing which will support the SS washers consumption too.

Policies such as Automobile Mission Plan 2016-26 Phase-II, Faster Adoption & Manufacturing of Electric Hybrid Vehicles (FAME) Scheme (I & II) and most recently introduced the PLI scheme for automobile and auto components would result in increasing demand for stainless steel washers (owing to their large-scale usage in automobile production). Together, these policies have helped in improving the manufacturing practices, quality standards, and efficiency standards in Indian automobile industry while vehicle Scrappage Policy 2021 it is likely to encourage new vehicle purchases thereby domestic automotive market and benefitting allied industries. Substantial outstanding investment and increase in announcement of new projects in auto and auto ancillaries augurs well for the SS washer industry in India.



Construction

Corrosion resistance, and long lifespan have all led to wide acceptance of SS washers in construction sector application. Infrastructure development, and a surge in real estate construction (residential & commercial) have created a high demand for SS washers. In past, the boom in construction which accompanied the strong economic growth in the country have supported the rising consumption of SS washers.

However, the sector has been severely hit by the occurrence of COVID-19 pandemic which has turned the overall business sentiment pessimistic. The construction activity in India have moderated over the last few fiscals due to combination of factors such as liquidity squeeze, higher cost of capital, delay in project clearance and bottlenecks in execution. In FY 2021, the construction sector severely impacted by Covid 19 Pandemic and where Construction sector GVA contracted by 8.6% against subdued 0.98% change in the previous year. In FY 2022, as per the government advance estimate, construction sector GVA is expected to expand by 10.7% on y-o-y basis, owing to government’s increased on infrastructure projects and increasing demand for residential and commercial segments post pandemic. The real estate and professional services segment are estimated to register 4% growth in FY2022

Favorable policies such as 100% FDI under automatic route in the construction industry is permitted in completed projects for operations and management of townships, malls/shopping complexes, and business constructions which would thereby boost the growth of construction sector in India. The growing construction of malls, hotels, office spaces and residential units would generate demand for stainless steel washers thereby resulting in growth of the market in India in coming years.

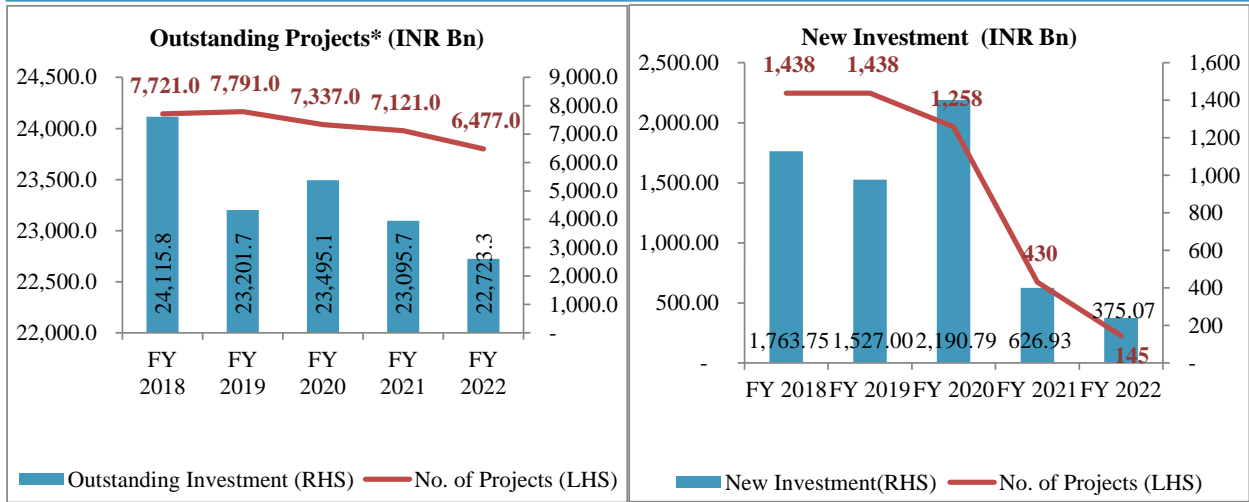
In residential space, new launches increased by around 47% y-o-y with about 139,526 units recorded in 2021 across the top seven cities. Additionally, sales of residential units witnessed an increase of 72% with over 128,000 units sold in 2021. The government initiatives including **Pradhan Mantri Awas Yojana** to prioritize affordable housing segment is contributing the sale of residential units in the country.

India	2020	2021	y-o-y Growth %
New Launches	94,793	139,256	147%
Sales	74,451	128,282	72%

Cities	New Launches (In Units)			Residential Sale (In Units)		
	2020	2021	Y-o-Y Change	2020	2021	Y-o-Y Change
Delhi	5,964	16,418	175%	15,743	23,109	47%
Mumbai	19,502	22,442	15%	19,545	25,368	30%
Pune	12,644	24,572	94%	9,246	21,717	135%
Bengaluru	23,120	22,838	-1%	10,440	27,118	160%
Chennai	7,135	7,425	4%	6,983	8,000	15%
Hyderabad	23,692	36,367	53%	9,926	15,787	59%
Kolkata	2,736	9,194	236%	2,568	7,183	180%

- In terms of sales, Bengaluru, Mumbai, and Delhi NCR accounted for about 59% of sales with Bengaluru dominating the yearly sales of residential units acquiring about 21% of total share in 2021.
- Hyderabad topped the new launch segment with about 26% of total new launches across seven big cities of India in the year 2021. Hyderabad, Pune, and Bengaluru accounted for 60% of the total new launches in 2021.

Investment Trend in Construction & Real Estate



Even though the new project announcement has declined sharply, the outstanding investment value in construction sector and new project announced value is substantial which is likely to have a favorable impact on the SS washer application in construction space. India residential sector has been witnessing a significant increase in demand in 2022 and is estimated to witness 5% capital value growth in 2022

India's Upcoming office projects

State	State Name of the Project	Expected Completion
Bengaluru	<ul style="list-style-type: none"> Vaishnavi Tech Square Brigade Triumph 	<ul style="list-style-type: none"> 2022
Chennai	<ul style="list-style-type: none"> Olympia Cyberspace DLF Downtown Phase I 	<ul style="list-style-type: none"> Q4 2022 Q2 2023
Delhi-NCR	<ul style="list-style-type: none"> DLF Downtown Block 2 One Qube 	<ul style="list-style-type: none"> Q2 2022 Q3 2022
Hyderabad	<ul style="list-style-type: none"> GAR Corp Laxmi Inforbahn Tower 8 Phoenix Avance Business Hub H09 	<ul style="list-style-type: none"> Q3 2022 Q3 2022
Kolkata	<ul style="list-style-type: none"> Ideal Unique Centre Siddha Esplanade 	<ul style="list-style-type: none"> Q2 2022 Q2 2022
Mumbai	<ul style="list-style-type: none"> Centarus Oberoi Commerz 3 	<ul style="list-style-type: none"> Q4 2023 Q2 2024
Pune	<ul style="list-style-type: none"> Bluegrass Business Park - Tower A Panchshil Business Park 	<ul style="list-style-type: none"> Q4 2022 Q2 2023

Solar Industry

SS washer also find significant application in solar panel mounting system, racking and installation. Solar grounding washer SPC-GW-25 made in stainless steel are preferred during to its durability. Thus, investment in solar industry towards solar panel to support solar industry expansion present promising opportunity for the SS washers industry.

Major Highlight of Solar Industry

Solar power is the largest component of RES capacity in India, accounting for nearly 47.5% of total RES installed capacity as on 1st January 2022. Capacity addition in solar power segment has happened at a brisk pace increasing from just under 1 GW as on 1st April 2012 to nearly 50 GW as on 1st January 2022.

Solar Power Generation in India: Growth in Installed Generation Capacity					
As on	1 st April 2012	31 st March 2018	31 st March 2020	31 st March 2021	31 st Oct 2022
In GW	0.94	21.65	34.63	40.08	61.6

Source: Central Electricity Authority

Although India's solar installations have grown almost tenfold from about 3 GW in FY 2014 to about 61.6 GW as on 31st October 2022, the growth in India's solar capacity has been driven mainly by imported PV

modules that enjoy nearly 90% share, as their costs are up to 30% lower. The manufacturing process of solar cell/module starts from silicon-polysilicon-ingots-wafers-cells-module. However, India currently produces only cells and modules with imported material. Solar cells are imported primarily from China, Malaysia, Singapore and Taiwan. **Domestically, India has about 3 GW of cell and 9-10 GW of module manufacturing capacity. However, only 2.3 GW and 5.5 GW of it, respectively, are actively in use while the annual requirement for the next 10 years is estimated around 30 GW, necessitating imports.** The industry lacks economies of scale, and R&D investment has also been insufficient. India’s investments in technological know-how remain low compared to other developed nations and China. The ministry of new and renewable energy’s scheme of incentivizing developers to set up manufacturing units is struggling to take off as the industry reels under the impact of the safeguard duty.

To push domestic manufacturing, India has announced to impose 25% Basic Customs Duty (BCD) on Cells & 40% BCD Modules effective from 1st April 2022. The customs duty will replace a 15% safeguard duty currently imposed on imports from China and Malaysia. The development follows the government announcing a production-linked incentive (PLI) scheme that offers manufacturers in 10 sectors, including those of high-efficiency solar modules, a total benefit of ₹1.97 trillion.

Solar Energy Target

Aggressive push for clean technology for sustainable development adopted by the Government to achieve the twin objective of reduction of carbon footprint as well as to reduce dependency on hydrocarbon-based power generation will continue to augment growth of the renewable energy sector. The Govt. has committed to reduce carbon emissions by 30% to 35% and increase renewables to 40% of the energy mix by 2030. Progressing with bullish approach on renewables, India has raised 450 GW of renewable energy by 2030. Moreover, a significant portion of new power installations will continue to come from renewables led by solar. Of the FY 2030 target, 280 GW of total 450 GW would come from solar power. To achieve the pledged target, around 25 GW of solar energy capacity is needed to be installed every year, till 2030.

Year	Solar	Total RES
2022	100	175
2030	280	450

Source: Ministry of New and Renewable Energy, RES- Renewable Energy Sources

The domestic manufacturing of solar part is likely to benefit several government initiatives that have been announced in the past such as production-linked incentive (PLI), domestic content requirement for CPSU

scheme and KUSUM scheme. Additionally, recent announcement pertaining to BCD on solar cell and module with also help with augmenting domestic manufacturing thereby pushing SS washer application in solar sector.

Water Resource Infrastructure

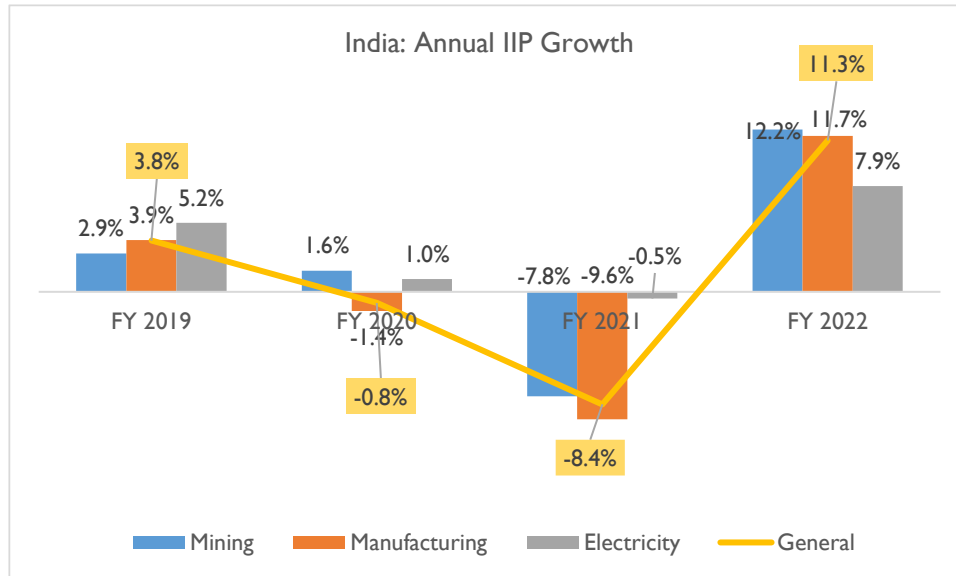
The government announce to launch The **Jal Jeevan Mission (Urban)** which aims at universal water supply in all 4,378 Urban Local Bodies with 28.6 Mn household tap connections, as well as liquid waste management in 500 AMRUT cities. It will be implemented over a period of 5 years, with an outlay of INR 2,870 Bn.

In the wake of drying conventional surface water and growing freshwater demand from various end-user segment, India is rapidly progressing towards a *water scarce nation* from *water stressed nation*. Consequently, the nation is exploring and investing in various water treatment technologies to support the nation's increasing freshwater demand for potable use. Since, SS washer possess better chemical resistance, its usage in wastewater treatment and water desalination industry is expected to grow in the wake of substantial investment planned to secure the supply of drinking water in India. As per industry sources, the size of India desalination plant valued at USD 830 Mn in 2018 and is projected to grow at a CAGR of 9% to reach USD 1.4 Bn by 2024. Many new desalination plants have been proposed to be set up in various states in coastal region such as Chennai, Gujarat, Mumbai and Andhra Pradesh.

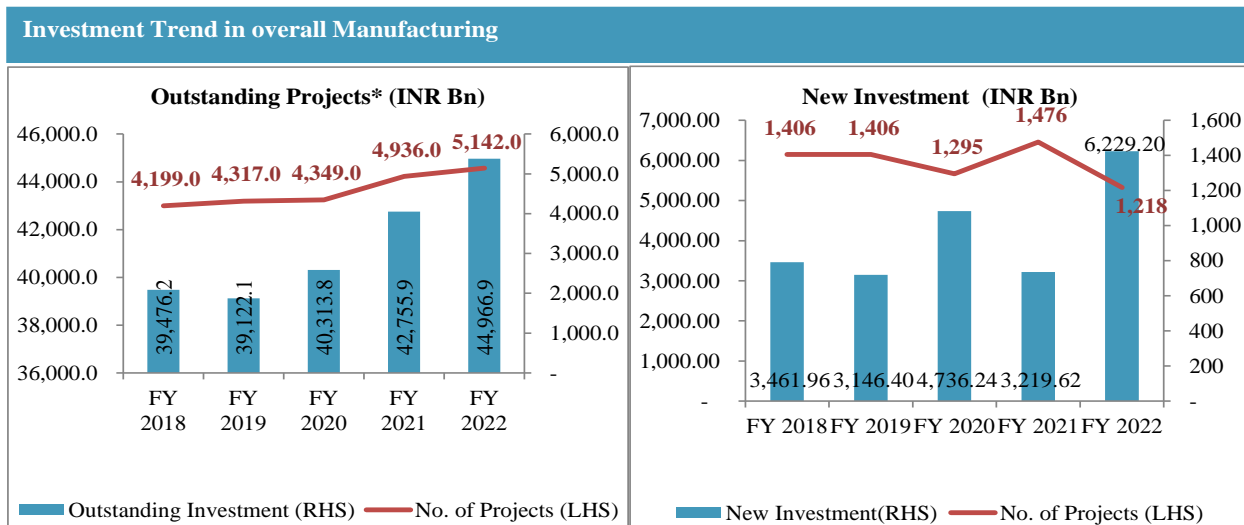
Besides water desalination, the government has also announced to launch The **Jal Jeevan Mission (Urban)** which aims at universal water supply in all 4,378 Urban Local Bodies with 28.6 Mn household tap connections, as well as liquid waste management in 500 AMRUT cities. It will be implemented over a period of 5 years, with an outlay of INR 2,870 Bn.

Industrial Sector Growth

Rapid industrialization in Indian economy, aided by favorable government policies, robust demand scenario, and penetration of export markets have led to capacity expansion in Indian manufacturing industries including automobile, chemical, electronics, pharma, oil& gas, fertilizers and many other. The resultant increase in demand for plant and machinery have had an equally strong demand for components used in manufacturing these equipment's including SS washers.



Industrial sector performance as measured by IIP index exhibited recovery in FY 2022 and registered 11.3% y-o-y growth as the economic activity resumed operations across all sectors backed by supportive government measure to revive economic growth. Prior to FY 2022, industrial growth observed a fluctuation and registered -0.8% decline in FY 2020 and even as steeper fall in FY 2021 on the back of Covid-19 pandemic. Decline in manufacturing activity was steepest. Historically, weak manufacturing sector growth have forced manufacturers to reduce production volume as well as put capacity expansion plans on hold. This generic slowdown in industrial sector is believed to have a cascading impact of various input and component that support the manufacturing and overall industry activity. The contracting industrial activity thus impacted the SS washers consumption in India which fell by nearly 15% in 2020. However, with recovering industrial sector activity in FY 2022, the SS washer in India is poised for a healthy growth in 2022.



Sources: CMIE Capex

Steady increase in outstanding investment and sharp increase in new projects value in overall manufacturing sector presents favorable opportunity for the SS washer industry in India.

Competitive Scenario

Washers' industry in India is highly fragmented in nature comprising large number of small players. Washer's manufacturing companies use various metals such as steel, copper, Aluminium, and rubber for manufacturing different types of washers. Among these, the most preferred washers, by domestic as well as global end-users, are stainless steel washers due to their corrosion and rust resistance properties. Generally, all washer manufacturers attempt to follow standards for manufacturing published by International Organization for Standardization (ISO), to maintain the quality of their products as per global standards and prevent any harm to the environment.

Within the washer industry, SS washers holds a distinguished position due to its numerous product attributes. These include resistance to corrosion, superior protection from abrasion & friction, and ability to retain mechanical properties at extreme temperatures. In addition, the recyclable nature of stainless steel gives it an advantage over other metal types. All these applications make SS washers ideal choice for demanding application, where other washers do not fare well.

However, the superior performance of SS washers can be attained only by ensuring high quality stainless steel as well as standardized manufacturing process. Availability of a steady supply of stainless steel is an integral factor. It is here the established players have managed to create an advantage, as well as maintain it. By means of backward integration as well as recycling of waste stainless steel produced during the manufacturing process, they have managed to create a steady supply of raw materials. This in turn have helped in creating a niche position in the washer industry.

These attributes meant SS washer is considered more as a value-added product, compared to other metal washers. The specialized product application also helps SS washer command higher price compared to other metal washers.

Apart from a mass production of generic washers, few industry players – mostly organized players – also produce customized washers for specific purposes according to the customer requirements. The Indian washer industry not only fulfils major portion of domestic washer's demand but is also one of the major exporters of different types of washers of global standards.

Globally, China has predominantly been the largest manufacturer and supplier of washers in the world. However, the aftermath of Covid-19 has brought some noticeable changes in the global-supply chains owing to the worldwide anti-China sentiment. Like other industries, this is the most opportune time for washer

manufacturers in India to focus on enhancing their production capabilities and capture a significant share in global market.

The biggest challenge for the industry is the rising cost of key input materials such as stainless steel, copper, aluminum, and other metals. Few large companies have undertaken backward integration in order to reduce dependency on outside raw material suppliers and cut down input cost to a certain extent. Such a strategy gives an edge to companies to compete better in terms of price as well as helps in achieving higher profitability. The well-known washers manufacturing companies include Ratnaveer Metals, Suchi Fasteners, Navgrah Fasteners, Gujarat Washers, SBP Automotive, Special Washers (India), Gala Precision Engineering, etc. The following table includes brief information of the companies:

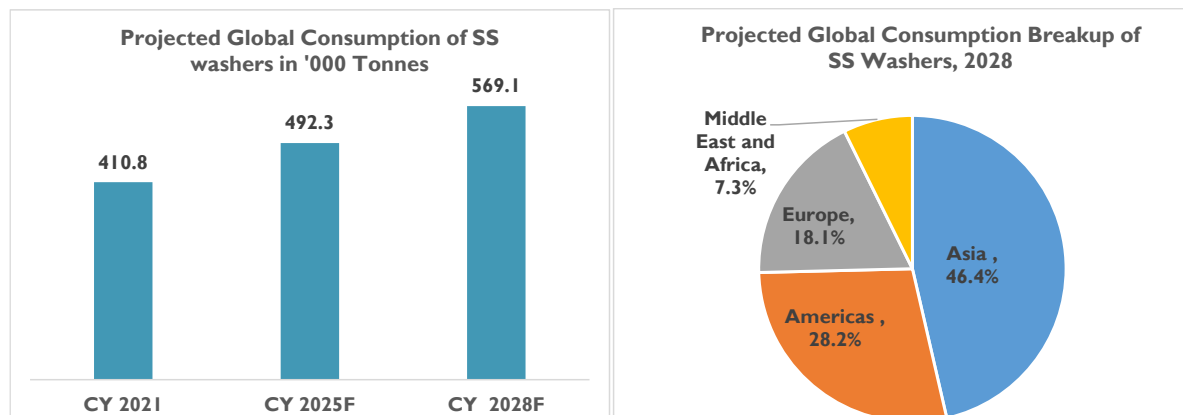
Name	Description
Ratnaveer Precision Engineering Limited	<p>Ratnaveer Precision Engineering Limited is the leading manufacturer, exporter, and supplier of stainless-steel washers in India. It is one of the largest manufacturers of washers, producing around 3500 - 4000 MT per annum (in FY 2022 the production volume was 3,630 MT) and enjoys economies of scale. The company has a wide product portfolio of more than 2500 different sizes and types of washers, that meets the requirement of wide range of customers across segments including some of the Fortune 500 companies. The company generated around 20% of the revenue from exports in FY 2022. Ratnaveer Metals is one of the largest exporter of stainless-steel washers in India and the one of the few to have backward integration in washers manufacturing process, due to which it has a competitive edge over its competitors in terms of better pricing and raw material supplies. The company has achieved revenue of INR 429.15 crore in FY 2022 and generated INR 85.98 crore solely from the export of stainless-steel washers.</p> <p>Revenue in FY 2022: INR 426.87 Crore</p>
Suchi Fasteners Private Limited	<p>Established in 1980, Suchi Fasteners is one of the well-known washers manufacturers and suppliers in India. The company maintains high quality production of bur free, smooth, and flat washers. At present, the company manufactures and exports aluminium, brass, copper, silicon, bronze, and stainless-steel washers. It</p>

	<p>specializes in countersunk type finishing cup and flanged washers as per global standards. The company generates ~70% of the total revenue from exports.</p> <p>Revenue in FY 2022: INR 118.49 Crore</p>
<p>Navgrah Fastners Private Limited</p>	<p>Navgrah Fastners, established in 2006, manufactures stainless steel washers, sheet metal parts, stampings, solar mounting hooks, connectors, and accessories. It mainly specializes in stainless steel washers and various hooks (haken) and all fastening parts for the solar mounting systems in stainless steel with powder coating or shot blasting. The company generates 64-66% of the total revenue from exports and rest comes from domestic sales.</p> <p>Revenue in FY 2021: INR 33.01 Crore</p>
<p>Gujarat Washers</p>	<p>Started in 1982, Gujarat Washers offers a wide gamut of washers which includes industrial metal fasteners, fastener nuts, washers, etc. The company is well-known for its stainless-steel washers and was recognized as the First Manufacturer of Stainless-Steel Spring Washers in India. The company has also gained recognition as one of the prominent industrial hardware fasteners, belleville spring washers and industrial washers exporters.</p>
<p>SBP Automotive Private Limited</p>	<p>SBP Automotive is an experienced automotive washer manufacturer and supplier, catering to a variety of industries such as automotive, manufacturing, mining, engineering and many other. The company offers copper washers, aluminium washers, spring washers and steel washers which come with a wide range of materials for different applications. Majority of the revenue comes from domestic sales with exports accounting for mere 1-2% of the total revenue.</p> <p>Revenue in FY 2022: INR 5.2 Crore</p>
<p>Special Washers (India) Private Limited</p>	<p>Established in 1996, Special Washers (India) is an ISO 9001-2008 Certified manufacturer, exporter, and supplier of industrial fasteners and sheet metal components including industrial washers, industrial screws, bolts, metal nuts, metal rivet,</p>

	<p>etc. The company offers products in various metals such as stainless steel, copper, phosphorous, and bronze.</p>
<p>Mitter Fasteners</p>	<p>Mitter Fasteners, established in 1982, manufactures nuts, bolts, and sheet metal components which adheres to the national and international standards such as ISO, JIS, DIN, etc. The company supplies its products to major OEMs in India and major buyers in Europe. Some of the major customers include Mahindra Rise, Ashok Leyland, Nissan, Anixter, Claas, Omax, Asal, Dana, etc. The company has an in-house manufacturing facility for Zn plating, heat treatment, and state of the art metallurgical lab.</p>
<p>Gala Precision Engineering Private Limited</p>	<p>Started its operations in 1995, Gala Precision Engineering is a manufacturer, supplier, and exporter of high-end technology solutions in the fields of surface engineering, and high-performance springs. In 2014, company expanded its product range of disc springs by adding bearing series disc springs and serrated washers. In 2018, the company launched gallock wedge lock washers and started supplying them to OEMs in India and major customers in Europe, USA, etc. Today, the company is a major trade partner for gallock washers to one of the globally top 3 wind turbine manufacturers. Currently, it generates 40-45% of the total revenue from exports.</p> <p>Revenue in FY 2022: INR 146.06 Crore</p>
<p>Autotech Industries (India) Private Limited</p>	<p>Based in Chennai, Autotech Industries (India) is involved in manufacturing of autotech engine components, autotech transmission components, and autotech hydraulic components since 1984. The company specializes in engine, transmission, clutches, axle, chasis, fuel system, and assemblies. It supplies and exports automotive products to major OEMs in India and other countries in the world. The company has five plants in Ambattur Industrial Estate. The company generates 82-85% of the total revenue from exports.</p> <p>Revenue in FY 2022: INR 538.32 Crore</p>

Global Growth Outlook

Going forwards, global SS washer consumption is slated to grow at CAGR 4.6% between 2018-25 and at 5% between 2025-28 to reach 492.3 thousand tonnes and 569.1 thousand tonnes, respectively.



Sources: Dun & Bradstreet Research

Increasing demand from construction of residential and office spaces coupled with ongoing infrastructural development projects across the world on the back of growing population and rising income are expected to drive the SS washers consumption during the forecast period. Besides above, the rising manufacturing activity particularly in emerging sector such as renewable energy, electric vehicle etc. along with other traditional end user sector such as automobile, consumer durable & electronics, oil & gas, and others to support urbanization are expected to aid the industry growth.

Regional Outlook

Geographically, the consumption breakup is expected to remain the same in 2028 but Europe and Americas is expected to lose marginal share to Asia and Middle East & Africa region. During the forecast period 2021-28, *Asia is projected to continue growing at highest CAGR of 5.4%*, followed by *Middle East & Africa growing at 4.9% CAGR, Americas at 4.6% and Europe at 3.4% CAGR*. In value term, the global size of SS washers is projected to grow at CAGR of 6.3% between 2021-28 to grow from USD 2,958 Mn to 4,618 Mn.

Asia

China, Japan, and India are major countries within Asia region that expected to lead the SS washer consumption owing to the presence of large number of industries. China, being the largest producer, consumer, and exporter of steel globally, retained its dominance in global SS washer industry in 2021 while Japan emerged as the second largest market for SS washer as it has the third largest automobile producing market in the world. Beside Japan, China, India, and South Korea have strong presence in automobile sector which is expected to push SS washers consumption during the forecast period.

Besides automobile, major upcoming infrastructural development projects including construction of office spaces by Hines and DNR group in Bengaluru, India, Sichuan-Tibet railway project in China, construction of 6,500 residential units per annum between 2022-26 and completion of 1,600 new hotel rooms in 2022 in Philippines and introduction of “Build! Build! Build!” programme (2017-2022) under which construction of about 102 airport projects is scheduled in Philippines would create demand for stainless steel washers during the forecast period.

Europe

In Europe, SS washer consumption is estimated to grow at healthy CAGR of 3.4% by volume and 5.2% by value to 103 thousand tonnes and USD 900 Mn between 2021-28, respectively on the back of the ongoing construction of five largest office buildings and rapid infrastructural development in the region. The construction of **five largest office** building that commenced construction in Q4 2021 include below

- **Toblerone Mixed-Use Towers in London UK** – USD 662 Mn
- **Althan Quartier Mixed-Use Complex in Vienna, Austria**– USD 507 Mn
- **Construction City Office Building in Oslo, Norway** – USD 350 Mn
- **Zagreb Headquarters and Technology Complex in Zagreb, Croatia** – USD 240 Mn
- **Rimac Headquarters Complex** – USD 238 Mn

The completion of the above five projects is scheduled of last quarter of year starting from 2023-25.

Beside above , infrastructural development projects including construction of Lyon-Turin high speed rail between France-Italy, Peljesac bridge in Croatia, Fehmarnbelt tunnel connecting Denmark and Germany would surge the demand for stainless steel washers in the coming years.

Additionally, Europe has strong presence in manufacturing sector and manufacturing is one of the largest economic sectors in the country generating about two-thirds of the Europe’s economic output. Presence of large number of manufacturing industries is expected to aid the consumption SS washers market during forecast period too. As per our analysis, Germany and France are two major country that leads the SS washers market in the Europe region as Germany is the world’s fifth largest steel exporter and exports steel to more than 200 countries. Germany also accounted for nearly 15% share in India’s total import of SS washers by volume in FY 2022. While rapidly growing construction sector and expansion of commercial spaces in France has made the country and attractive consumption market for SS washers.

Middle East and Africa

In Middle East & Africa, SS washer consumption is estimated to grow at healthy CAGR of 4.9% by volume and at ~7% CAGR by value to 41.5 thousand tonnes and USD 353 Mn by 2028, respectively owing to presence of countries like Morocco, United Arab Emirates and South Africa which are the major manufacturing hubs in the region coupled with **Turkey** and **Dubai** dominating the automotive sector of the region.

Furthermore, the ongoing construction of mega projects including **Regalia residential tower in UAE**, **Kenya standard gauge railway**, **Konza**-a technology city in Kenya, **Neom business city** in Saudi Arabia, **Davinci residential towers in UAE**, **Jeddah central redevelopment project in Saudi Arabia** and many others are expected to boost the demand for stainless steel washers and support the projected SS washer consumption in the region.

Our analysis reveal, Turkey followed by Saudi Arabia as the two major nation driving the consumption of SS washer consumption in the region. Turkey dominated the overall Middle East and Africa stainless steel washers as the automotive sector is one of the largest industrial sectors in the country and 15th largest in the world. Additionally, Turkey is the manufacturing hub and thus supports the production, export and engineering of global brands for international markets.

Americas

In America, SS washer consumption is estimated to grow at healthy CAGR of 4.6% by volume and at ~6.3% CAGR by value to 160 thousand tonnes and USD 1,371.5 Mn by 2028, respectively. Increasing real estate construction in both residential and commercial spaces and ongoing construction of mega infrastructure projects would augment the growth of Americas SS washers. As of March 2022, around 144.7 million square feet of office space was under construction in U.S. nationally which is expected to create demand for SS washers. Furthermore, construction of ongoing mega projects including JPMorgan Chase's new office in New York, Amazon Headquarter 2,830 Brickell office spaces, California high speed rail, Buffalo Bills stadium would have a favorable impact on SS washers demand.

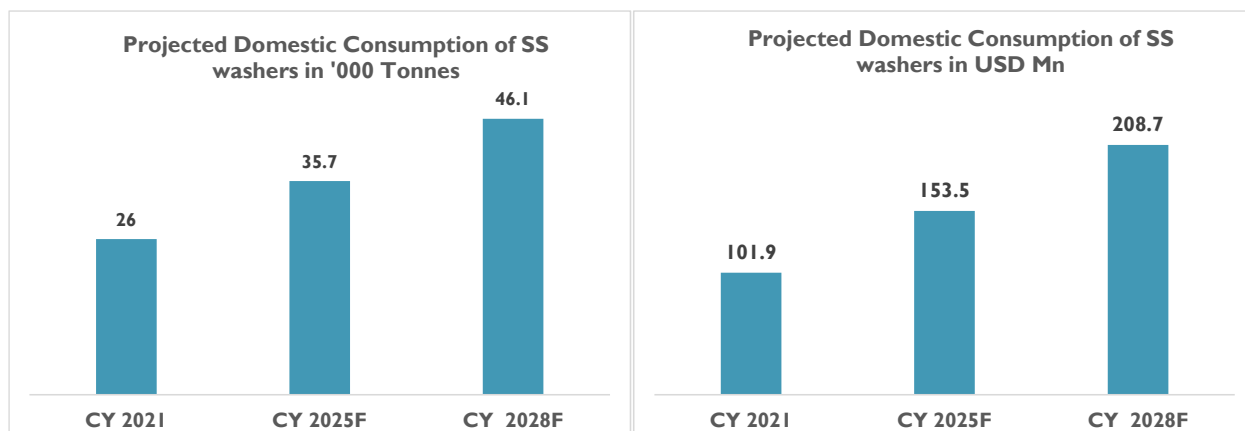
Additionally, large scale presence of leading automotive OEM in USA is expected to push the regions SS washer consumption growth. With large population base and large population and largest automobile industry in Detroit city, USA retained its dominance as the largest consumption market for SS washers in Americas region in 2021. . Detroit city in USA has the biggest automobile industry dominated by three large companies namely **General Motors**, **Ford** and **Chrysler**. Strong presence of auto manufacturing base has potential to create demand for lock and keyed washers owing to their large-scale usage in automotive applications.

Canada is the other leading country for SS washer in the America region as it is major exporter of steel to the USA and Mexico.

Indian Growth Outlook

The Union Government has formulated “National Steel Policy 2017”, which is expected to guide the growth of Indian steel industry for the next decade. As per the policy, the installed steel production capacity in India is expected to reach 300 million tons by 2030 while the production of crude steel would reach 250 million tons. These aggressive goals are on the back of the expected demand from construction as well as consumer products like automobiles.

Despite becoming one of the fastest growing economies in the world, the infrastructure sector in India is yet to develop fully. Therefore, substantial government expenditure is planned in major end user industries under National Infrastructure Pipeline and recently announced PM Gati Shakti project. The National Infrastructure Pipeline aims to improve the ease of living for its citizen. It will include projects in various sectors such as housing, safe drinking water, access to clean and affordable energy, world-class educational institutes, healthcare for all, modern railway stations, airports, bus terminals, metro and railway transportation, logistics and warehousing, irrigation projects, etc.



Sources: Dun & Bradstreet Research

Thus, the aggressive public and private investment sprucing up in the infrastructure would translate into higher demand for various steel product including SS washers.

We expect domestic SS washer consumption volume to grow from about 26 thousand tonnes in 2021 to 35.7 thousand tonnes by 2025, growing at CAGR 8.2% between 2015-28 and later reaching 46.1 thousand tonnes by 2028, translating into 8.8% CAGR between 2025-28. In value term, the SS value consumption in India is slated to grow at average annual rate of 10.7% between 2021-28 to reach USD 208.7 Mn.

However, overall economic activity faces a major downside risk if RBI with recent hike in repo rate continue to increase repo rate amidst rising inflationary pressure. This may the fresh capital investment in the various sector and may temporarily affect the end user industries demand for SS washers.

On supply side, supportive policy announcement like Atmanirbhar Bharat, PLI, amended DMISP policy and Make in India scheme are expected to have a lasting favorable impact on domestic manufacturing and strengthening the supply side dynamics.

SS Sheet Metal Components

Global Consumption Pattern

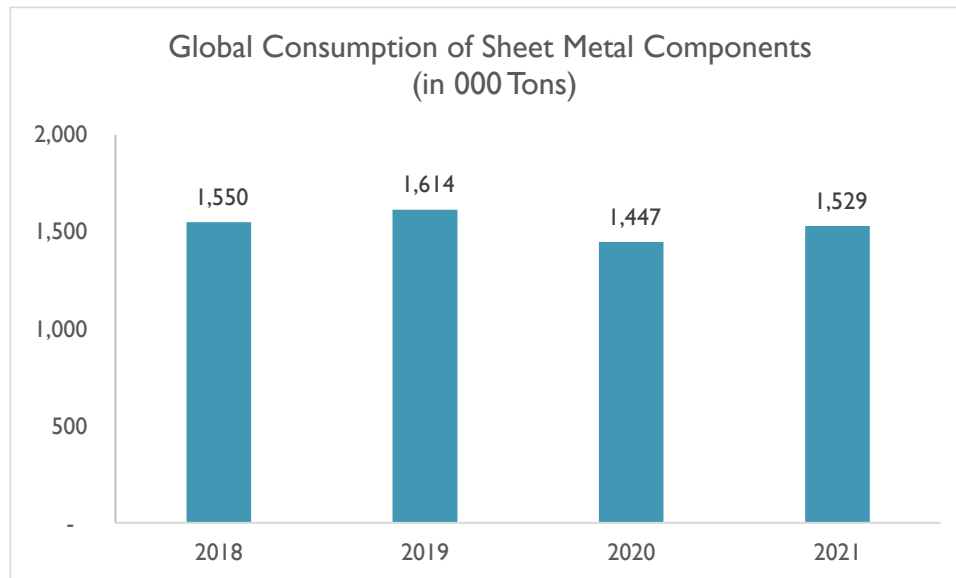
Globally, consumption of sheet metal components is approximately 1,500 thousand tons per annum in 2021, while annual production is approximately 1,750 thousand tons per annum. Consumption has picked up in 2021, growing by 6% after a 10% decline in the previous year to the Covid-19 induced disruptions.

Although consumption volume in 2021 is well below the post covid-19 (2019 consumption) scenario, the year-on-year growth during 2020-21 indicates the strong optimism. This is based on the higher growth rate in consumption during 2020-21, as against growth registered in 2018-19.

In terms of sales value, global sales of SS metal components touched USD 12.5 Bn in 2021, the strongest growth in the past four years. Sales value has even surpassed the 2019 figure, indicating the strong rebound in demand post the Covid-19 disruptions.

Few common types of sheet metal components include:

- **Sealing Caps Core Plugs & Welch plugs:** Manufactured out of Mild Steel, Stainless Steel, and Brass material being used the Engine & Transmission blocks. These components are available in both Cylindrical and Conical type.
- **Clamps, Clips & Brackets:** These are being used in Automotive, Tractor, Earthmoving equipment, and Farm equipment as per customers' requirements
- **Push Nuts, U-clip Nuts, Self-threading Nuts:** These components are made out of medium carbon and high carbon steel with hardening & tempering and Electroplating with Hydrozen De embrittlement process.
- **Constant Pressure Hose Clamps:** These are manufactured out of high carbon steel and carbon alloy steel for the fuel and liquid rubber pipes/hoses in the Engines and other applications.



Based on inputs from primary survey

Region Production & Consumption Volume in 2021 (in 000 Tons)

Region	Production Volume	Consumption Volume
Asia	1180.3	659.1
Europe	228.4	278.3
Middle East & Africa	43.6	116.2
Americas	291.1	475.6

Based on inputs from primary survey

Regional Production & Consumption Value in 2021 (USD Million)

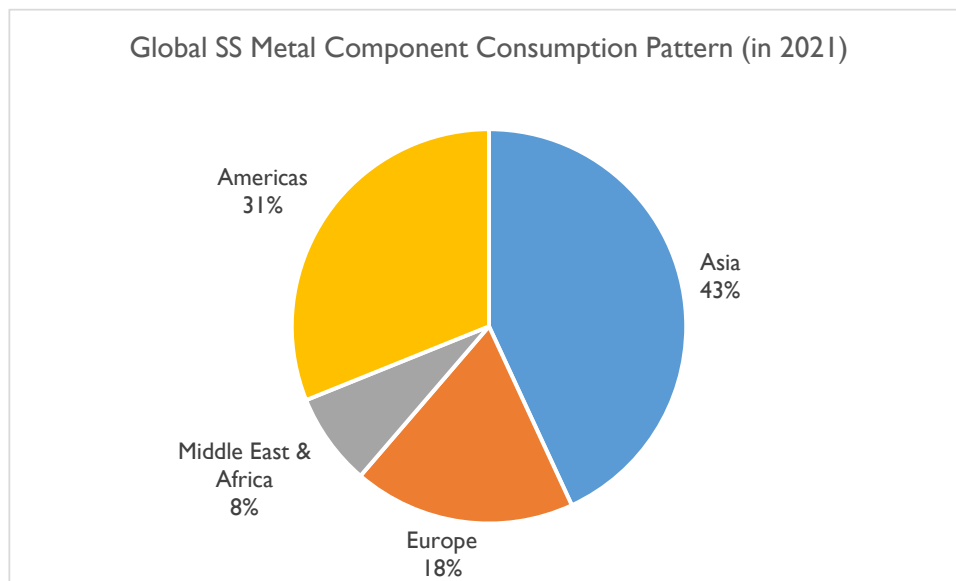
Region	Production Value	Consumption Value
Asia	USD 9,348 Million	USD 5,012 Million
Europe	USD 1,949 Million	USD 2,403 Million
Middle East & Africa	USD 363 Million	USD 966 Million
Americas	USD 2,461 Million	USD 4,006 Million

Based on inputs from primary survey

Asia is the leading market, both in terms of consumption and production. The shift in global manufacturing, from Europe and North America to Asian market on the back of cost differences and environmental concerns have shifted production of a wide range of products & components. The ascendancy in SS metal components is a result of this development. In 2021, Asia accounted for nearly 67% of total annual production and 43% of total annual consumption.

China and Japan are the two largest consuming markets in Asia, followed by India. Strong growth in real estate construction, automobile manufacturing, and general capacity expansion in manufacturing industries have created demand for SS metal components. Both production & consumption of the product in European and American market has been declining, as bulk of manufacturing shifted to Asia.

America is the second largest consumer of SS metal components, after Asia. In 2021 America (North and South) accounted for nearly 31% of total global consumption. Europe accounted for 18% of consumption while Middle East & Africa accounted for the remaining 8%.



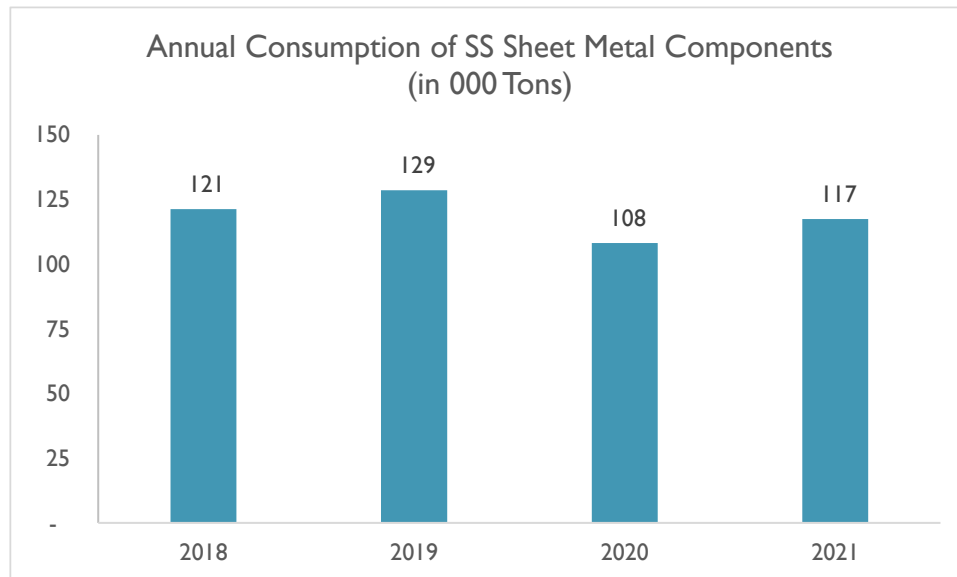
Based on inputs from primary survey

Domestic Consumption Pattern

The annual volume of SS sheet metal components consumed in India is approximately 117 thousand tons in 2021, which is worth USD 710 Mn. Annual consumption volume dropped in 2020, as demand was severally impacted by the spread of Covid-19 pandemic.

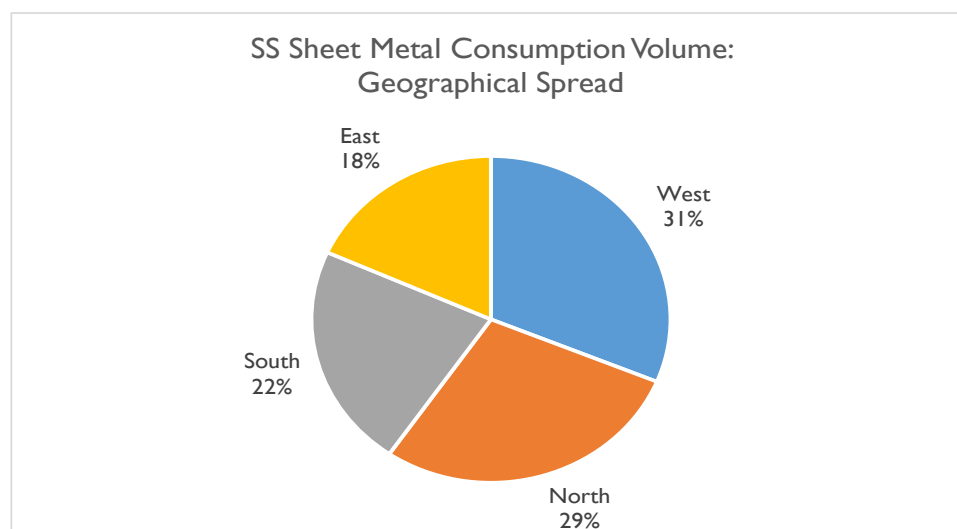
With Covid cases waning, demand landscape has improved in 2021. In response the consumption volume has picked up, increasing by nearly 8.5% over previous year. Despite this growth, annual consumption volume is yet to reach the post covid-19 levels.

Meanwhile, domestic production of SS sheet metal components is estimated to be 139 thousand tons in 2021, while the value of production stood at USD 848 Mn.



Based on inputs from primary survey

Demand is highest in the Western region, predominantly due to the presence of a fledging industrial sector in Maharashtra & Gujarat. In addition, a stable construction sector has also aided the western region. Backed by strong demand from these two-customer segment, Western region is estimated to have accounted for 31% of total SS sheet metal component consumption in India. Northern & Southern region formed the second and third largest geographical market, accounting for approximately 28.5% and 22.2% of total consumption volume respectively. Remaining consumption was accounted by Eastern region, making it the smallest market.



Based on inputs from primary survey

Competitive Scenario

Sheet metal component manufacturing as such is an extremely fragmented industry with unorganized segment having a sizable market share. The industry is characterized by low entry barriers – in terms of openly accessible not too complex manufacturing process, ease of availability of raw materials as well as labor force, lower capital investment requirement, and absence of any regulatory hurdles. These attributes make the industry an attractive proposition for smaller player to enter. On the demand side, the near universal application of sheet metal components has ensured a stable demand. Together these two factors (low entry barriers and a stable demand) have given the industry its fragmented nature.

Majority of these attributes hold true for SS sheet metal components too. The only difference is the usage of specialized input material (stainless steel), which is priced higher than other steel grades. Although this pose a challenge – compared to other metal grades used – it is not strong enough to alter the competitive nature of the industry. Hence the competitive landscape in SS sheet metal component manufacturing is almost like that prevalent in the larger sheet metal component manufacturing industry.

Despite the commoditized nature of the product, there exists few factors that could provide a manufacturer in this industry a competitive edge. Creating a strong product portfolio catering to multiple industries / applications, backward integration), and well-developed R&D capabilities to create new products. Among these, backward integration has a far-reaching impact and probably plays a larger role in improving operational efficiency and controlling cost.

Stainless steel manufacturing is a consolidated industry with large players, and they enjoy higher bargaining power vis-à-vis SS sheet metal components. Given the fragmented nature of SS sheet metal component manufacturing, they are not equipped to country moves by stainless steel industry to increase their product price or prioritize supply to other applications / consumer segments. It is here that backward integration makes a difference. Backward integration – be it by acquiring a stainless-steel melt shop or utilizing scrap manufacturing during the process as an input material – ensures SS sheet metal manufacturer have access to steady supply of quality raw materials.

Notable SS Sheet Manufactures	
Viman Engineering Private Limited	The Company manufactures & exports a wide range of washers, and sheet metal components for application in automotive, solar, medical device manufacturing and heavy engineering industries, among others.

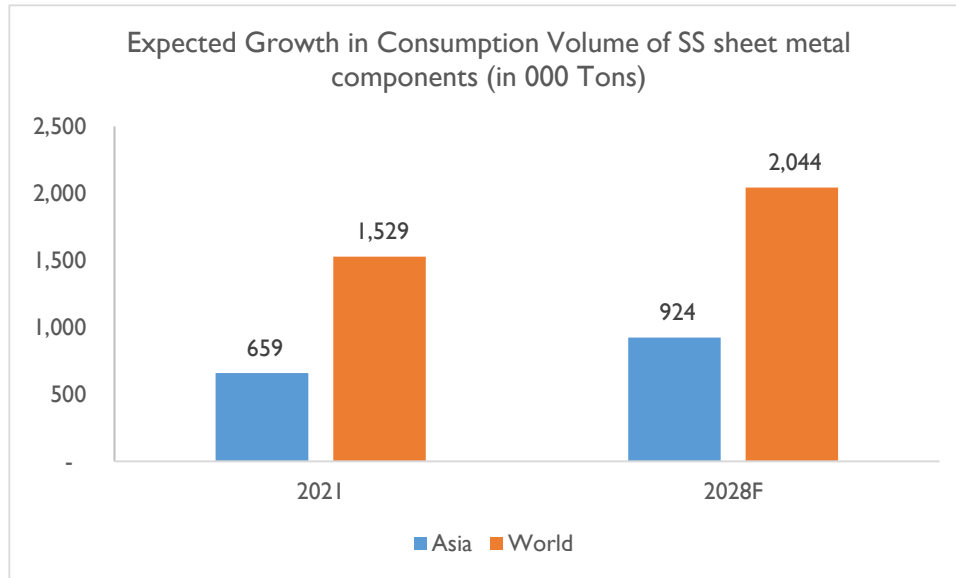
RAAMPS Industries	The Company, established in 1984 manufactures sheet metal components for automobile , telecommunication, oil & gas, home décor, solar, and heavy engineering, among others.
Ratnaveer Precision Engineering Limited	Ratnaveer, established in 2002, manufactures SS washers, pipes & tubes, and sheet metal components. In SS sheet metal components, the Company focuses on solar power generation sector where it is used in mounting of solar panels.

Global Growth Outlook

Demand from Asian markets would be the key factor in driving the global demand for SS sheet metal components forward. By 2028, the total volume of SS sheet metal components consumed in Asian market is expected to reach 924 thousand tons per annum. This converts into a compounded growth rate of 5% during 2021-28 period.

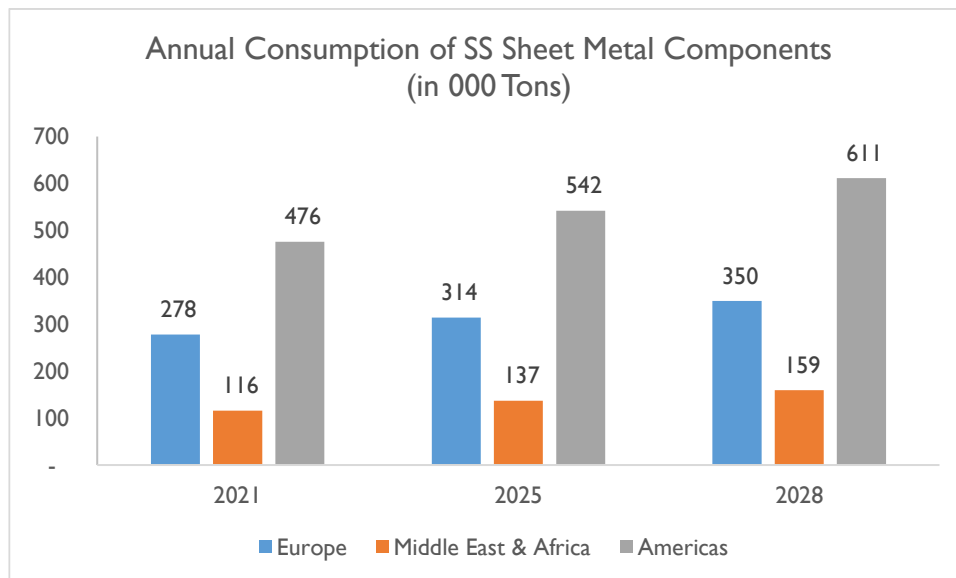
On the back of this strong demand in Asia, the global consumption of SS sheet metal components is expected to reach 2,044 thousand tons per annum by 2028. Consumption in Asian market is expected to account for nearly 45% of total global consumption in 2028.

In value terms, the total value of SS sheet metal components consumed in Asia is expected to reach USD 8.2 Bn per annum in 2028, increasing by a CAGR of 7.3% between 2021-28. On the back of this strong growth in Asian market, the global sales of SS sheet metal components is expected to grow by a CAGR of 6% during 2021-28 to reach USD 18.7 Bn.



Dun & Bradstreet Research

Among other markets, Middle East & Africa is expected to grow the fastest, by a CAGR of 4.6% during 2021-28 period while consumption growth of SS sheet metal components in Europe and Africa would be 3.3% and 3.6% respectively.

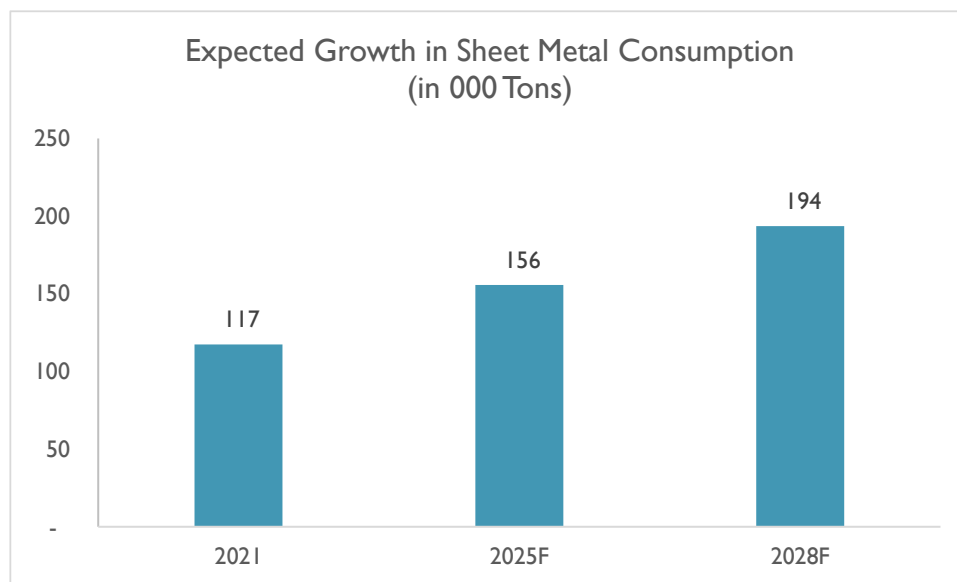


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India Growth Outlook

Indian economy has rebounded strongly, after two years of slow growth one of which is on account of Covid-19 induced disruptions. Demand for consumer products, ranging from consumer durables to big ticket purchases like automobiles & residential units has witnessed a strong recovery. This overall improvement in demand scenario has helped in the revival of industrial growth.

SS sheet metal components, which has a near universal application across manufacturing sector has benefitted by this revival in industrial activity. Barring any exception event (similar to the scale of Covid-19 pandemic), Indian economy is widely expected to return to a long-term growth path. This would help SS sheet metal component industry to put the recent dip in production (in 2020 and 2021) behind it. Going ahead, the annual consumption volume of SS sheet metal components is expected to touch 156 thousand tons in 2025, and further to 194 thousand tons in 2028. This would help increase the annual sales turnover in the sector – which currently stands at USD 710 Mn – to USD 1,019 Mn in 2025 and further to USD 1,336 Mn in 2028.

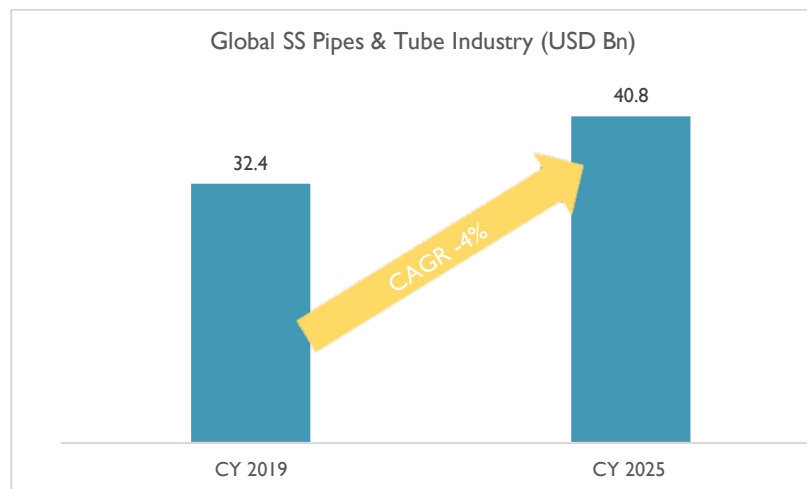


Dun & Bradstreet Research

Stainless Steel Pipes and Tubes

Global Scenario

Globally, the SS pipes and Tube industry was valued at nearly USD 32.7 Bn in 2021¹⁵ contributing ~23% share in global pipe & tube industry. In coming years too, the SS pipe & tube is expected to observe stable growth of ~4% through 2025 with market size estimated to cross USD 40 Bn.



Sources: Dun & Bradstreet Desk Research & Estimates

Demand Landscape

The oil & gas industry is among the major consumer segments for steel pipes and tubes used for transportation of gas & liquid as well as for upstream, midstream, and downstream processing of crude oil. With global economies gradually recovering from the pandemic impact, the demand for oil & gas is expected to resume quickly. Spreading Covid-19 cases at the start of 2022 once again shed some uncertainty over the economic recovery but this time the surge in infection caused muted impact on oil demand. Moreover, mobility indicator continued to remain strong lending the positive outlook for the Oil demand in 2022.

According to the International Energy Agency (IEA), from 97 Mn barrels per day (BPD) in 2018, the oil demand is expected to increase by 5.5 mb/d in 2021 and by 3.3 mb/d in 2022 while it is estimated to return to the pre-pandemic level at around 99.7mb/d in 2022 projected to reach 103 mbd by 2030. However, the current Russia-Ukraine conflict could change the demand-supply dynamics between various countries in the coming years.

As a result, new pipelines projects are being commissioned, pipelines capacities are being expanded and increasing offshore activities such as deep and ultra-deep-water production and development are having a positive impact on the steel pipe segment.

Further, with development of new natural sources such as natural gas and shale gas the pipeline segment is expected to witness increasing demand. Also, stainless steel seamless pipes may witness the development of innovative technology in directional drilling which requires use of high strength and versatile properties. Seamless pipes are preferred because welded pipes can leak and corrode thus causing damage to the encompassed fluid.

Developed nations are taking measures to cut down on carbon emissions. High efficiency generation of seamless steel pipes are being increasingly being used in industrial boiler applications which include ultra-supercritical pressure boilers, pressurized fluidized bed boilers and high-efficiency industrial waste incineration boilers among others primarily to control carbon dioxide emissions. Seamless pipes are preferred in such segments owing to their higher strength, durability, and corrosion resistance properties.

Global stainless-steel pipe manufacturers are also exploring options for producing stainless steel welded pipes that are custom made for specific industries. For this purpose, manufacturers are using different proportions of the alloy mix and offer various geometries, which enables them to cater to a wide cross-section of diverse demands. Also, stainless steel welded pipes are being increasingly used for specialized applications in biochemistry and medical devices wherein companies are investing in their research and development efforts to cater to the specialized needs of these end-use industries.

Few industries specific research analysis, highlight that the steel tube market dominates the overall industrial tubes market where overall global industrial tube market was estimated to be valued at ~USD 478 Bn in 2018 and is further slated to observe decent 5.8% CAGR between 2018-23. Attributed to its metal properties, SS tubes is expected to witness growing application in global petrochemical, chemical industry, energy & power and automotive. Stainless steel is widely used in manufacturing of SS pipes, Mechanical Tubes, Heat Exchanger Tubes, Structural Tubes, Hydraulic & Instrumentation Tubes and Others (Capillary Tubes, Boiler Tubes, Precision Tubes).

The pipeline segment is expected to register steady growth within the US, which being a leading producer of oil & gas accounts for nearly 23% and 17% share in global gas and oil production. According to Global Data's report, 'North America Oil and Gas Projects Outlook to 2025 – Development Stage, Capacity, Capex, and Contractor Details of All New Build and Expansion Projects', North America is expected to witness the operational commencement of 603 projects during 2021-2025. The US dominates the upcoming project landscape in North America, with nearly 70% share of the total projects which are expected to start

operations by 2025. Out of these, newly announced projects dominate with 83% while the remaining are expansion projects mainly in the upstream sector. Major upcoming projects in the US, such as the Alaska LNG liquefaction plant worth USD 43 Bn and Cameron LNG Liquefaction Plant worth USD 33 Bn, are expected to drive the need for oil & gas equipment including steel pipes & tubes.

Europe, with more than 80% of the oil & gas production taking place offshore, is among the major producers and consumers of seamless steel pipes owing to the on-going oil & gas exploration activities followed by cyclical maintenance in the region. However, with the European Union extending the annual tariff quotas on steel product categories (which includes non-alloy hot and cold rolled sheets, gas pipes, seamless stainless tubes and pipes, large, welded tubes etc.) for the next three years (starting July 1, 2021), it could lead to a demand – supply mismatch in the region.

Asia Pacific seamless steel pipes market is expected to show robust growth owing to the increasing demand for oil and gas, adoption of advanced technologies, rising industrialization and infrastructural growth including water management, among others. South Korea, China, India, and Japan are some of the key countries contributing to the high demand for seamless pipes in the Asia Pacific. Being the highest steel producer, China occupies a large share in the seamless steel pipe production due to easy availability of raw materials which makes it easy for manufacturers to avail the same at lower costs for their end use as well for import purpose.

Indian Steel Pipe and Tube Industry

Since 2000, steel production in the country has seen a phenomenal increase as the sector witnessed high investments in capacity addition as well as technology up-gradation. In 2018, India surpassed Japan to become the second largest steel producer in the world, after China. According to World Steel Association (WSA), India produced 118.13 Mn tons of crude steel in CY 2021 and accounted for 6.1% share in global crude steel production. In 2021, India's crude steel production registered a robust y-o-y growth of 18% against 10% contraction in the previous year while it grew at a CAGR of 4% between 2017-21.

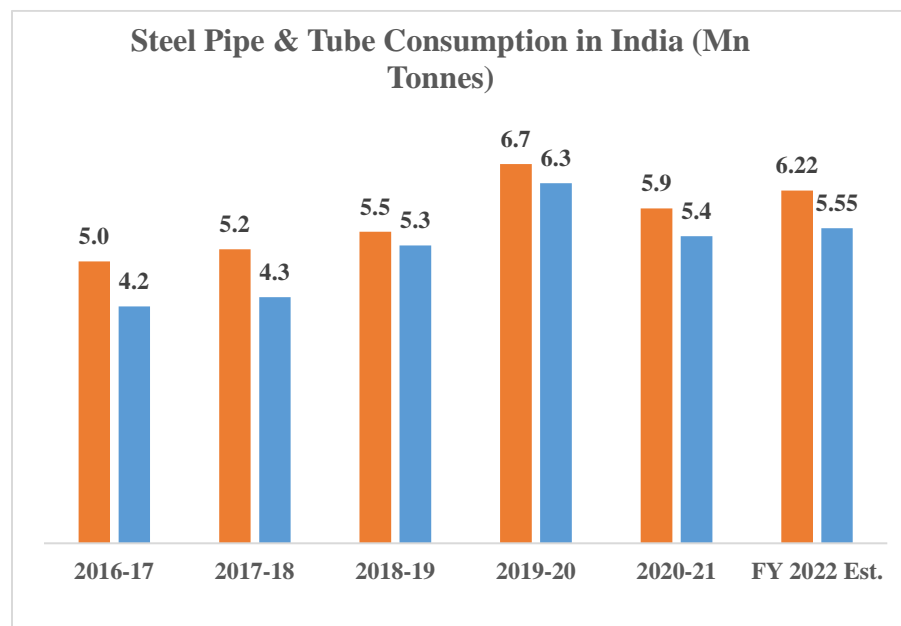
On consumption side, India is also the second largest consumer of finished steel. The emergence of a middle-class consumer segment has altered the consumption landscape in India, and with it the industrial production. The country's overall finished steel consumption in India is estimated to have been growing at 7% per annum since 2016 till 2019 to reach 102.6 Mn Tonnes but in 2020, it dropped by 14% against 6% y-o-y growth in 2019. Compared to 2020 finished steel consumption in India increased by 3.3% to 106 Mn tons.

Steel Pipe and Tube Segment

Steel pipes & tube segment constitute ~8% share of the total steel consumption. Subdued industrial activity, and economic uncertainty have dampened the demand scenario, leading to lower consumption. However, economic recovery in 2021 points towards rising consumption of finished steel, consequently driving the steel production. During 10M FY 2022, the country's finished steel production was 21.06% higher than previous year output and it stood at 93.3 Mn tonnes while its consumption was ~15% higher and stood at 86.83 Mn tonnes.

Presence of such a vast primary steel manufacturing infrastructure has also helped in the growth of secondary and finished steel products. In pipe & tube segment, India has emerged as one of the major producers of steel pipes after Europe and China. The country has a well-developed steel manufacturing industry capable of manufacturing crude steel to value added steel products including pipes & tubes. Availability of raw material, cheap labor, and ability to produce steel as low cost have supported India's progress in steel pipe and tube industry.

As per industry sources, the country's current manufacturing capacity of steel pipes and tubes stand at around 21.5 Mn tonnes which is further split into welded, seamless, and casted pipes with respective capacity of 16.3 Mn Tonnes, 1.5 Mn Tonnes and 3.7 Mn Tonnes. Within welded pipes segment, ERW capacity is estimated at 9.5 Mn tonnes and SAW pipes at 6.80 Mn Tonnes.



Sources: Dun & Bradstreet Desk Research & Estimates

Annual production of steel tubes & pipes in India is estimated to reach 6.22 Mn Tonnes in FY 2022 while apparent consumption¹⁶ is estimated at 5.55 Mn Tonnes, but it continued to remain lower compared to the pre-pandemic level (FY 2020). Rising output is backed by resuming demand recovery in the major end user industry demand. The country’s 10M FY 2022 steel pipes & tubes output was up by 8% while its consumption was up by 4% on y-o-y basis to reach 5.18 Mn Tonnes and 4.63 Mn Tonnes, respectively.

In value terms, the size of the Indian steel pipes & tube industry is estimated at nearly INR 550-600 Bn. With nearly 10 Kg per capita consumption (PCC), steel pipes & tubes consumption in India is less than half of the global average (21-22Kg PCC) and about one fifth of the Chinese (55-60Kg PCC) which indicates huge opportunity for growing penetration of steel pipes & tubes in the Indian market.

In terms of market segmentation, steel pipes & tube industry is equally split between ERW and SAW & Seamless pipes (S&S pipes) while by volume the ratio stands at 70:30, respectively. ERW pipes find prominence because of their diverse applications as well as implementation of advanced technology such as the Direct Forming Technology (DFT) which allows for customized sizes and cost savings on raw material.

¹⁶ Apparent Demand is derived demand from Production + Import – Exports, a proxy indicator to represent the consumption trend of a product.

Demand Landscape

Stainless steel pipes and tubes are one of the important products in the steel industry and it find wide application in oil & gas, capital goods, power and several other. In the industrial sector, it is used in the manufacturer of the heat exchanger, condensers, and similar industrial equipment that are used in chemical plants, fertilizer plants, pharmaceuticals, sugar, dairy & dairy products, water desalination and automotive industry amongst other. Additionally, steel pipes & tubes also find application in construction. Oil & gas and chemical & petrochemical industry – are the two largest consumers of steel pipes and tubes – is driving the demand across the world. Thus, demand for steel pipes & tubes is linked to the demand scenario and capex plans prevalent in its end-user industries.

Demand from Oil & Gas sector

Oil & Gas sector is one of the largest end user industries for steel pipes and tubes including SS pipes and tubes with pipelines being the major mode of transport for petroleum, oil, and lubricants. Therefore, oil & gas industry has a close linkage that dictate steel pipes and tube demand in the country. Stainless steel offer good resistance to high-pressure and high-temperature and so is widely used in refineries, pipelines, storage capacity, gas terminals, and retail outlets.

India is currently the 3rd largest energy and oil consumer in the world after China and US. The Indian Oil & Gas (O&G) industry is distinguished in the global context as it contributes to 4.6% of the global oil demand with consumption of 4.8 barrel per day in 2021. As per IEA recent published report (under stated policy scenario), India's oil consumption is projected to rise by 50% by 2030 comparison to global demand growing by 7%. India's oil consumption is expected to grow by 4.8 million barrels per day (mbd) in 2019 to 7.2 mbd in 2030 and 9.2 mbd in 2050. India will continue to remain the third largest consumer of oil in 2030.

For Natural gas, the country's consumption projected to double to 133 billion cubic meters in 2030 from 64 BCM in 2019 as against a 12% rise in global gas demand. Currently, India is also the 4th largest refining capacity globally after US, China, Russia, having total refining capacity of 249.87 Mn Metric Tonnes per annum (MMTPA) as on year ending on 1.04.2021 while per day refining capacity stood at 5 Mn barrel. As per IOC, a leading Indian Refiner, the country needs to add 2 Mn barrel per day by 2030 to support the country's economic expansion.

The wide network of oil & gas pipeline infrastructure has been a major factor in driving the demand for steel pipes & tubes. With Indian economy registering one of the highest growth rate in the world – a pattern that is expected to continue in the future – energy demand in the country would only increase. Aggressive expansion of oil & gas pipelines to meet this demand is set to continue, which in turn would keep the consumption of steel pipes & tubes by the industry stable.

Demand from Pharmaceutical Industry

Indian pharmaceutical industry is ranked as the third largest in the world, in terms of volumes of drugs manufactured and thirteenth largest, in terms of value. The Country is also the world's largest supplier of cost-effective generic drugs, and accounts for one fifth of the global trade in generic drugs. India has achieved an enviable position in global generic drug market on the back of its strength in organic chemical synthesis and process engineering.

As the acceptance of generic drugs increases in the developed markets, particularly the US, India's position in the global generic market will continue to rise. The move in the US market towards an affordable healthcare framework, aided by supportive Government policies, will augur well for Indian companies already present in the US market. Exports, which has been the mainstay of Indian pharmaceutical space, would be instrumental in driving the future growth.

On the domestic front, the favorable demand created by increasing older population, and rise in incidences of lifestyle diseases would continue to facilitate domestic revenue growth. However, the lifestyle disease segment is largely addressed by patented drugs by innovator pharmaceutical companies, who are primarily multinational players. The presence of Indian generic pharmaceutical companies in this segment is low.

On the back of the above favorable factors, the compounded annual growth rate in the pharmaceutical industry is expected to be higher than the growth rate recorded in the last decade. During the time FY 2021-30, the annual turnover in Indian pharmaceutical industry is expected to grow by a CAGR of 10%, to reach INR 7,840 Billion.

This aggressive growth in sales can be supported only by an aggressive expansion in manufacturing capacity. Consequently, pharmaceutical industry is expected to witness strong growth in both greenfield and brownfield capacity expansion projects. The relaxation in foreign investment norms would address the credit availability issues that generally hobble capacity expansion projects. Subsequently the demand for capital goods, including steel pipes & tubes used in pharmaceutical manufacturing plants would increase, and serve as a strong demand driver for the domestic steel pipes & tubes industry.

Demand from chemical & petrochemical industry

Steel pipes and tubes form the backbone of fluid and gas transport system in process industries. The type and grade of steel pipes & tubes used depends on the environment where it is installed as well as the nature of products that are transported. In chemical & petrochemical plants, pipes and tubes are exposed to toxic environment leading to corrosion. The anti-corrosive property of SS pipes & tubes is the preferred fluid & gas transport system in these plants. Hence, the growth in chemical & petrochemical manufacturing capacity in the country has directly contributed to higher demand for SS pipes & tubes.

Annual production of basic chemicals – organic, inorganic, alkali chemicals, dyes & pigments, and pesticides – is estimated to be 11.2 Mn Tonnes in FY 2021. Alkali chemicals – consisting of soda ash, caustic soda, and liquid chlorine – accounted for 70% of production volume in FY 2021, followed by inorganic chemicals, and organic chemicals. On the other hand, annual production of major basic petrochemicals is estimated to 17.9 Mn Tonnes in FY 2021 while the total production of basic major chemicals and basic major petrochemicals reached 29.2 Mn Tonnes.

To cater the growing industries demand, substantial investments are planned in chemical and petrochemical sector. As per CMIE data, about 375 new projects were announced in the chemical sector, however value wise, overall investment higher than annual cumulative investment value announced in FY 2021. This implies larger value per project during YTD FY 2022.

Demand from capital goods industry (manufacturing of heat exchanges, condensers & similar equipments)

Capital goods like heat exchanges and condensers are integral part of process industries, ranging from manufacturing of food & beverage products, chemicals, pharmaceuticals, petrochemicals, plastic products, rubber products, and paper & paper products.

Pipes & tubes made of SS is considered the most ideal material for heat exchangers, because of the anti-corrosion nature. SS heat exchangers provide good resistance to corrosion and it also helps in minimizing the deposits of limestone and other residues. SS High Precision and Heat Exchanger Tubes are widely used in process industries, ranging from chemicals, petrochemicals, fertilizer, sugar, and dairy & dairy. Additionally, SS pipes and tubes also find applications in water desalination plants & other water treatment plants, as well as power plants. The corrosion resistance, and high resistance to chemicals are the two key reasons for this preference for stainless steel over other materials.

Rapid industrialization in Indian economy, aided by favorable government policies, robust demand scenario, and penetration of export markets have led to capacity expansion in Indian manufacturing industries, ranging from textiles, chemicals to fertilizers. The resultant increase in demand for process plant equipment & other industrial machineries have had an equally strong demand for stainless steel used to manufacture these equipment's. The demand for process plant equipment and other industrial equipment's of similar kind is linked to the industrial scenario prevalent in the country.

Demand from Automobile Industry

In automobile manufacturing, SS pipes & tubes are used in the production of components ranging from exhaust systems, transmission systems, oil & fuel flow systems, and coolant circulation systems, to name a few. Thus

the rise in automobile production and sale in India over the last couple of decades have translated into positive demand for SS pipes & tubes.

Annual production of automobiles reached a high of 26.3 million units in FY 2019, before dropping to 21.5 million units and 18.6 million units in the subsequent years. Improvement in demand in FY 2022, as the impact of Covid-19 pandemic wore off, has resulted in an improvement in production volumes. Annual production has improved to 22.9 million units in FY 2022, registering a strong recovery from the steep drop that happened in the previous year. Such large production volume has created strong demand for all types of auto components as well as related input materials. SS pipes & tubes too have benefitted by the presence of such a strong automobile manufacturing infrastructure.

Demand from architecture, building & construction (ABC) segment

Superior aesthetics, corrosion resistance, and long lifespan have all led to wide acceptance of SS tubes for architecture, building & construction application. Infrastructure development, and a surge in real estate construction (residential & commercial) have created a high demand for stainless steel, along with other building & construction materials. In past, the boom in construction which accompanied the strong economic growth in the country have resulted in higher consumption of stainless steel.

However, the sector has been severely hit by the occurrence of COVID-19 pandemic which has turned the overall business sentiment pessimistic. The construction activity in India have moderated over the last few fiscals due to combination of factors such as liquidity squeeze, higher cost of capital, delay in project clearance and bottlenecks in execution. In FY 2021, the construction sector GVA contracted by 8.6% against subdued 0.98% change in the previous year. Talking about FY 2022 (current fiscal), surge in the Delta variant during the second wave of pandemic starting from end of February and strengthening till May 2021 was a drag on the overall economic recovery. On sequential Q-o-Q basis, India's GDP fell by 17% in Q1 FY 2022 as compared to the previous quarter output (Q1 FY 2022 change over Q4 FY 2021). However, it registered healthiest ever quarterly growth in Q1 FY 2022 while much of this sharp surge in GDP growth was attributed to the low base-effect (as country observed a contraction of nearly 24% in GDP during Q1 FY 2021).

The country rebounded well from the Covid slump in subsequent quarters. With supportive government measure, India managed to registered growth for five consecutive quarter starting from Q3 FY 2021. As per the government advance estimate for FY 2022, the country's GDP is estimated to grow by 9.2% while construction sector GVA is expected to expand by 10.7% on y-o-y basis. Such a strong growth in building construction is expected to revive the demand for SS tubes & pipes.

Impact of Covid-19 on Steel Pipes & Tubes

The onset of Covid-19 in 2020 disrupted the capital expansion plans in the manufacturing sector. The tepid demand scenario forced the India Inc to defer its capacity expansion plans. This trend was observed across all major sectors in the manufacturing space. Such a steep decline in capital expenditure pattern across the manufacturing industry proved detrimental to the steel pipe industry. As the demand for steel pipe & tube is tied to industrial construction, the dip in capital investments translated into lower demand in FY 2021.

Capital expenditure pattern in India was already on the wane in FY 2020, as the economic growth slowed down, on account of unfavorable economic factors. The scenario worsened in FY 2021 as the impact of Covid-19 added on to the already pessimistic mood in Indian corporate sector.

In FY 2022, the business operation gradually returned to normalcy with gradual relaxation in restriction announced to curb second wave. Furthermore, the government continuing effort to scale up vaccination, strengthen healthcare infrastructure, living with virus attitude and other economic measure to restore the economy back on the growth trajectory supported the growing consumption volume of steel pipes & tubes during YTD FY 2022. During 10M FY 2022, the country's consumption of steel pipes & tubes registered 4% y-o-y growth.

Competitive Landscape

Compared to carbon steel pipes, SS pipes & tube manufacturing sector is consolidated in nature, with few major players accounting for majority market share. Capital intensive nature of the industry coupled with challenging operating environment has erected steep entry barriers in SS pipes & tube sector, handing incumbents a definite advantage. It is estimated that the capex required to set up a SS pipe & tube manufacturing facility is ~15 times that required to set up a carbon steel pipe manufacturing facility of similar capacity. Such a high capital requirement translates into higher upfront investment, which dampens the interest of smaller players.

SS pipes & tubes are used in harsh environment as well as for specialized application in mature sectors like oil & gas, petroleum refining, chemical, pharmaceutical, and other similar process industries. Compared to carbon steel pipes, the volume requirement is higher while breaking into large consumer segment is challenging and time consuming. Since, SS tubes form an integral part of any new expansion project in the above-mentioned consumer industries, products are subject to rigorous testing for technical competence post which price comes in.

Although this increases the time required for a manufacturer to bag new orders, a successful track-record provides an advantage which can be leveraged in future contracts & requirements. Any new player entering

this industry will have to invest considerable time and capital to develop products that meet the customer standards as well as prove their superiority over existing players.

All these attributes have resulted in creating a high entry barrier in the domestic SS pipes & tubes industry, resulting in a consolidated market. This consolidated nature augurs well for incumbent players as they are well placed to exploit the opportunities arising because of capital investment across key end user consumer segments.

Major Players

Ratnamani Metals & Tubes Limited, Jindal SAW, Maharashtra Seamless Limited, Man Industries and Welspun Corp are few of the major players in Indian steel pipe & tube segment. All these companies have a wide product portfolio, offering SAW, ERW, Seamless and Stainless-Steel Pipes & Tubes. Among these Ratnamani and Jindal SAW have an established SS pipes & tubes business, placing them as market leaders in this segment. Other notable players include Skoda Tubes, Maxim Tubes Company Private Limited and Shubhalaxmi Metals & Tubes Private Limited.

Notable Players in Indian SS Pipe & Tube Industry							
Company	By Variety-Type				By Raw Material Type		
	ERW	SAW	Seamless	DI	Carbon Steel	Mild Steel	SS
Ratnamani Metals & Tubes Limited	✓	✓	✓	✗	✓	✗	✓
Jindal SAW Limited	✗	✓	✓	✓	✓	✗	✓
Welspun Corp	✓	✓	✗ ¹⁷	✗ ¹⁸	✗	✓	✗
Skoda Tubes	✗	✗	✓	✗	✗	✗	✓
Maxim Tube Company Private Limited	✗	✗	✓	✗	✗	✗	✓
Shublaxmi Metals & Tubes Private Limited	✗	✗	✓	✗	✗	✗	✓

Dun & Bradstreet Research, Company Websites

¹⁷ Announced the Entry into SS seamless pipe segment in FY 2021.

¹⁸ Announced the Entry into DI pipe segment in FY 2021. Greenfield facility coming up at Anjar, Gujarat to be commissioned by April 2022 .

Order Book Position Ending on 31st December 2021 (in INR Crore)

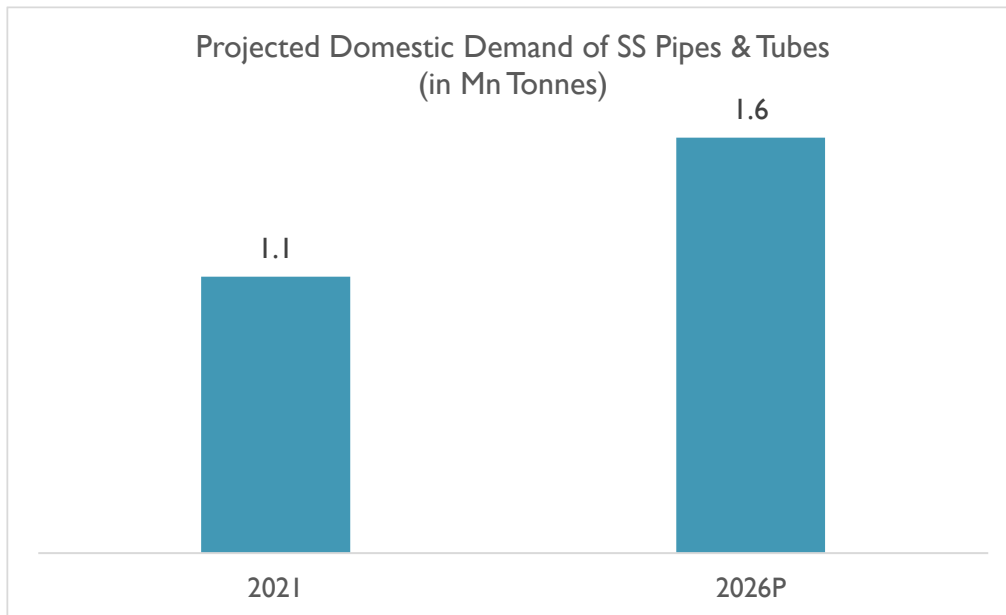
	FY 2019	FY 2020	FY 2021	As on 31 st Dec 2022
Ratnamani Metals & Tubes	1,500	1,380	1,498	1,900
Jindal SAW	8,340	5,700	5,961	4,681
Maharashtra Seamless	810	625	8,370	1,619
Welspun Corp	14,100	5,700	4,800	4,700
Man Industries	2,000	1,500	1,600	NA

Center for Monitoring Indian Economy

Growth Outlook

From demand perspective, India's growth scenario for steel pipes and tube including SS pipes and tubes remains intact on the back of substantial government expenditure planned in major end user industries under National Infrastructure Pipeline and recently announced PM gati Shakti project. The various initiatives for infrastructure development under the PM Gati Shakti will propel the demand of steel in various sectors thereby enhancing steel usage and growth of the SS pipes & Tubes. We expect domestic SS pipes & tube industry to grow from about 1.1 Mn tonnes currently to 1.6 Mn Tonnes by 2026, growing at CAGR 8.5%.

This coupled with supportive policy reform through scheme like Atmanirbhar Bharat, PLI, amended DMISP policy and Make in India will give push to domestic manufacturing and strengthen the supply side dynamics. However, domestic SS face a major downside risk from rising imports, mainly from low-cost destination like China which is creating material harm to the domestic industry. Given the higher input cost and other overheads, domestic manufacturers find it difficult to compete with Chinese imports based on price. Only government level initiatives, to create a level playing field would help in nullifying this challenge. In addition to above, the high probability of RBI moving away from maintaining accommodative monetary policy amidst rising inflationary pressure may further intense the fresh capital investment in the sector.



Sources: Dun & Bradstreet Estimates

Financial Analysis

Revenue Growth Pattern

In order to study relative performance of the industry players, the financial analysis of six companies has been undertaken which include Suchi Fasteners, Ratnaveer Metals, Navgrah Fastners, and SBP Automotive, Gala Precision Engineering, and Autotech Industries (India). The companies selected here fall in the same revenue range as Ratnaveer Precision Engineering Limited.

Till FY 2019, the washer industry in India registered a significant growth in sales. However, during past two consecutive years, the industry witnessed a slowdown in demand, resulting in drop in revenue of many companies. The revenue de-growth in FY 2020 could be attributed to the prevailing slowdown in major end-user sectors such as automobile, followed by worldwide pandemic-led disruptions in the last quarter of the financial year. The operations and production activities were highly impacted due to Covid-19 induced lockdowns and strict restrictions imposed by Central and State Governments in the late part of FY 2020 and in the beginning of FY 2021. FY 2022 saw a revival in growth, as normalcy began to return as covid-19 related restrictions were removed.

Year-on-Year Revenue Growth (%)	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Suchi Fasteners	7.1%	48.1%	-5.4%	-8.2%	43.9%

Ratnaveer Metals	-8.1%	30.9%	25.6%	22.5%	18.1%
Navgrah Fastners	22.6%	3.9%	7.0%	-10.8%	50.1%
SBP Automotive	9.2%	13.4%	-28.6%	27.8%	17.2%
Gala Precision Engineering	14.8%	21.3%	0.8%	1.3%	40.0%
Autotech Industries (India)	9.7%	29.3%	-13.4%	8.8%	23.5%

Source: Ministry of Corporate Affairs, Dun & Bradstreet Research

However, with the gradual opening up of the economy and easing of Covid restrictions by governments, economic activities in the country started picking up. The demand for washers, however, remained low due to sluggish demand scenario in end-user industries. The demand scenario which improved temporarily after the first wave was again affected with the weak consumer sentiments due to second wave of pandemic.

Despite slowdown in demand, large companies like Ratnaveer Metals could not only survive the slowdown but also registered a significant growth in revenue during FY 2020 and FY 2021. The slowdown in demand and pandemic-led disruptions mainly affected the operations of small companies operating at lower scales. With the rapid rollout of vaccines across the world and improvement in demand scenario, the industry may witness a gradual pick-up in demand in coming years.

Operating Cost Trends

The key operating cost for washers manufacturing companies is the raw material cost, which accounts for major portion of total operating expenses. Typically, a raw material cost for washers manufacturers accounts for 70%-80% of total revenue and varies according to the metal or material used in the production. For the companies under coverage, the raw material cost ranges from ~40% to highest 85% of their net sales.

Cost of Materials Consumed	FY 2019	FY 2020	FY 2021	FY 2022
Suchi Fasteners	78.47%	76.91%	78.95%	75.48%
Ratnaveer Metals	79.47%	81.22%	85.00%	85.03%
Navgrah Fastners	82.25%	81.42%	80.73%	78.4%
SBP Automotive	61.40%	51.19%	57.30%	65.25%
Gala Precision Engineering	43.45%	37.84%	37.57%	40.50%
Autotech Industries (India)	36.37%	40.57%	29.55%	45.23%

Source: Ministry of Corporate Affairs, Dun & Bradstreet Research

Key input materials like stainless steel, aluminum, and iron are witnessing a continuous rise in prices and demand, but relatively low supplies. The industry has seen significant rise in stainless steel prices in past few

years owing to various global factors such as continuous rise in trade value of Nickel, freight shortages, and increase in fuel prices.

Furthermore, the recent Russia-Ukraine war has worsened the scenario. Russia is one of the major producer of steel and nickel and controls around 8% of the global supply. The war-induced sanctions imposed on it will result in a curtailed supply globally. Though India does not depend on Russia for nickel, it is still feeling the squeeze, since the overall supply has been affected and resulted in extreme price volatility. However, post clarity on the war situation, steel prices may cool off to sustainable levels.

Other Major Cost Heads

Salary & Wages	FY 2019	FY 2020	FY 2021	FY 2022
Suchi Fasteners	6.96%	7.23%	7.67%	6.13%
Ratnaveer Metals	2.75%	1.96%	1.70%	1.79%
Navgrah Fastners	2.03%	1.94%	3.32%	3.0%
SBP Automotive	11.10%	14.31%	13.14%	10.74%
Gala Precision Engineering	17.81%	18.94%	16.82%	14.16%
Autotech Industries (India)	15.07%	13.13%	10.59%	11.26%
Interest Expenses	FY 2019	FY 2020	FY 2021	FY 2022
Suchi Fasteners	1.16%	1.21%	0.97%	0.93%
Ratnaveer Metals	3.24%	4.08%	2.40%	2.73%
Navgrah Fastners	1.80%	1.70%	1.35%	2.3%
SBP Automotive	0.85%	1.22%	0.81%	0.50%
Gala Precision Engineering	4.94%	5.48%	5.59%	3.33%
Autotech Industries (India)	0.31%	0.58%	0.41%	0.24%

Source: Ministry of Corporate Affairs, Dun & Bradstreet Research

Profitability Scenario

The increasing cost of key inputs is estimated to be putting pressure on profitability margins, which can be seen with the decline in EBITDA and net profit margins of most of the companies covered. With rise in raw material cost and other expenses like salaries & wages, EBITDA margins of the companies have been affected significantly in FY 2021. Subsequently, net profit margins of some companies have also been affected adversely on y-o-y basis. FY 2022 witnessed improvement in margin for most of the players, as economy turned favorable as covid-19 restrictions were lifted.

PBITDA	FY 2019	FY 2020	FY 2021	FY 2022
Suchi Fasteners	5.48%	7.21%	3.33%	8.01%
Ratnaveer Metals	8.49%	8.34%	5.88%	6.81%
Navgrah Fastners	6.26%	6.42%	7.00%	6.69%
SBP Automotive	5.78%	7.87%	6.28%	4.23%
Gala Precision Engineering	14.05%	10.67%	12.68%	15.52%
Autotech Industries (India)	20.21%	19.98%	27.86%	25.81%
PAT	FY 2019	FY 2020	FY 2021	FY 2022
Suchi Fasteners	2.56%	3.72%	1.23%	4.85%
Ratnaveer Metals	2.93%	2.74%	1.76%	2.23%
Navgrah Fastners	2.36%	2.63%	3.60%	2.19%
SBP Automotive	2.95%	3.33%	1.94%	1.23%
Gala Precision Engineering	3.90%	1.24%	1.76%	5.60%
Autotech Industries (India)	11.12%	12.24%	18.93%	17.92%

Source: Ministry of Corporate Affairs, Dun & Bradstreet Research

Key Risks & Challenges

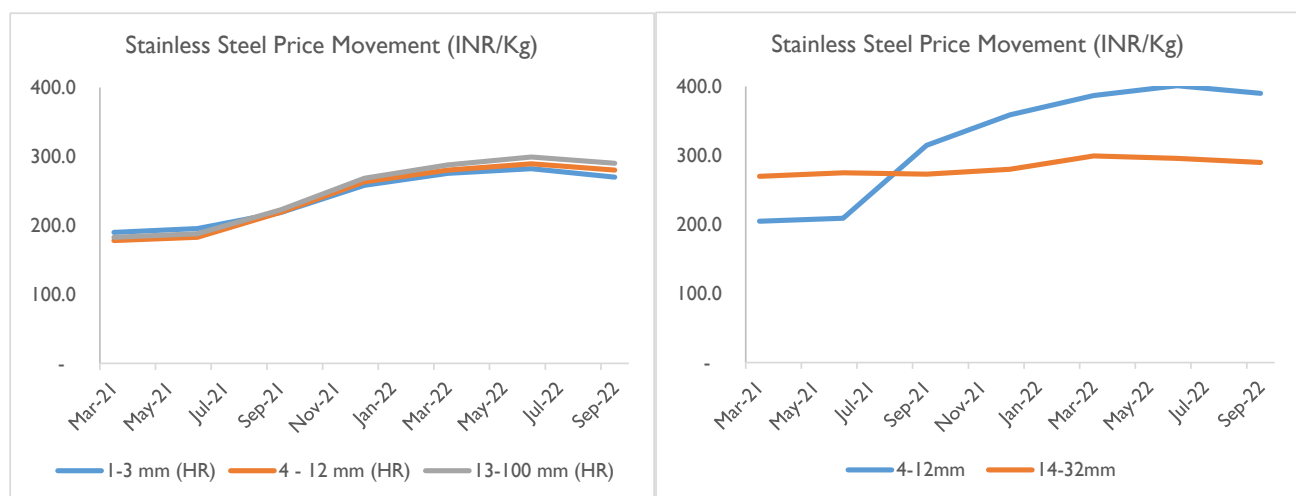
Delays in construction projects

Demand for SS pipes is largely dependent on development projects undertaken by government entities or agencies. A major economic downturn for example Covid-19 Pandemic like crisis have potential to disrupt industry demand/delay for various projects. Delay in new projects announcement, clearances, required approval, project implementation and funding issue in industrial and infrastructure projects pose potential risk to pipes demand. The capital investment scenario in Indian industrial sector has been pessimistic in the past couple of years. The mounting NPA (non-performing assets) have forced banks to go slow in offering credit. Furthermore, the drop-in demand scenario is discouraging corporate sector to invest in new plants / capacity expansion.

Thus, the demand for industrial equipment's and consumables used in setting up industrial infrastructure projects. On overall basis, SS steel pipes and tube sector have also been impacted by this development in the last two year. Accordingly, capex in overall steel pipes and tubes industry have also observed moderation during FY 2020 and FY 2022. Number of outstanding and new projects announced has gradually reduced over the past three years.

Raw material: availability & price

With raw material cost being the single largest operating cost, change in price of steel (finished steel as well as stainless steel) will have a direct impact on the production cost of SS sheet metal components. 2021 witnessed an upward movement of SS prices in India, as well as globally. Several factors ranging from supply disruptions due to restrictions in freight movement, surcharge on raw materials (like nickel), and higher overall demand have resulted in this price hike. This has in turn increased the raw material procurement cost of SS sheet metal component manufacturers.



Source: CMIE Industry Outlook, Prices quoted in Mumbai market

Threat of imports

Increasing import from is cited as major threat to stainless steel product manufacturer including SS based pipes & Tubes. In Union-Budget 2021-22, the government announced revocation of CVD on imports of certain hot rolled and cold rolled stainless steel flat products originating or exported from China (uptill 30th September 2021) and subsequently extended it upto 31st Jan 2022 . Moreover, the budget also announced the revocation of the provisional CVD on import of flat products of stainless steel, originating or exported from Indonesia.

As a result, India observed sharp surge in stainless-steel imports in FY 2022 where India's import intensity for stainless steel flat product market is almost 5 times higher at about 25% as compared to 5-6% for the overall steel industry. Industry sources suggest, during the four months in FY 2022 India SS import surged sharply by over 177% as compared to last year FY 2021 average and by 159% from FY 2017 average (a base year prior to the imposition of CVD on China). China and Indonesia share in India's basket of SS import during July 2021 inched up to 66% and 15% with total share from these two countries reaching to over 81%. This is substantially high in comparison to during H2 FY 2018 (post CVD imposition), when China's share stood at 27% and Indonesia's share at 3%. This surge in imports is backed by the non-WTO compliant subsidies of 20-30% that is extended to their stainless-steel manufacturers by China and Indonesia and has resulted in imbalances in Indian as well as in global market.

The detail review of the industry development over the last two three years also suggests a large part of import from Indonesia are being driven by the Chinese companies operating from Indonesia. China has been investing aggressively in Indonesia to scale up SS capacity and displace India as a second largest SS player in world. Indonesia currently has a total installed capacity of 5.5Mn tonnes, which is higher than India (5 Mn tonnes) and the country is estimated to have replaced India to become the second largest SS producer globally in 2021.

In addition, Indonesia's SS capacity is also 25 times more than their total annual domestic consumption requirement of just 0.2 MTPA which serve India as a fertile dumping ground for Indonesian SS flat product exports as Indonesia is a part of India's free trade agreement (FTA) with the Association of Southeast Asian Nations (ASEAN). In FY 2020, as much as 24% of the market was captured by imports where almost 50% SS flat product was imported from Indonesia.

This surge in cheaper import is severely hurting the supply dynamics of domestic SS industry with underutilized domestic capacity which is dwindling somewhere near 60%. Majority of underutilized capacity is concentrated in MSME segment which contributes about 28% share (1.4 Mn Tonnes) in total SS capacity of

India. Under-utilization of domestic capacity are adding its resulting woes to the domestic SS industry such as falling revenue, declining profitability, significant unemployment, bringing fresh investment at halt, turning many companies out of business, and converting many manufacturers into trader. A profitability comparison of EBDITA to net sale ratio between carbon steel and SS manufacturer clearly state the low profitability of SS steel players. During FY 2021, the EBDITA margin of carbon steel companies like Tata Steel, JSPL, JSW, and SAIL, was 34%, 39%, 27% and 18% respectively in comparison to SS companies such as Salem Steel Plant (measured on PBIT), Shah Alloy, Jindal Stainless (Hisar) Ltd and Jindal Stainless Ltd for which it stood at 3%, 7%, 12% and 12% respectively.

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