India's International Trade of Four Specific commodities in the Recent Past Some Insights

Preface

The study uses trade indicators to analyse merchandise export and import data in a way that should be useful for the purpose of policy. The indicators provide a glimpse of the trade patterns of the world and the performance of India in comparison to various other countries. They have been used in the case of India's exports of **Unwrought Zinc and Pig Irons** and imports of **Silicates and Machinenary for mfg of Plastics or Rubber products** to indicate the possible directions policy may take.

The data used in this study has been sourced from the Export Import Data Bank of the DGCI&S, Department of Commerce, and Government of India and from the United Nations Comtrade Database. Introduction notes of each commodities has been sourced from the various sights –viz Wikipedia, Britannica, The Economic Times etc.

Computations are based on data at ITC-HS four-digit level (ITC-HS Code-7901 & 7201 for export and 2839 & 8477 for import) and the latest finalized data available on the UN Comtrade Database up to year 2022 and on the DGCI&S Database up to June 2023. So, trends from 2019 to 2022 have been shown when we extract the data from UN Comtrade and from 2019 to 2022 have been shown when we extract the data from DGCIS Data base.

In this report, we will see various analysis and aspects of India's Precious as well as International export trade of Unwrought Zinc and Pig Irons and imports of Silicates and Machinenary for mfg of Plastics or Rubber products**.** We will use both the 4 digit Commodity codes, for our analysis, as appropriate.

Trends in India's as well as International Trade i.e. Exports and Imports of above four Commodities are given below in different tables :

- Table 1 : India's top 10 Export destination of Unwrought Zinc with their shares in percentage.
- Table 2 : World's top 10 Exporters of Unwrought Zinc with their shares in percentage.
- Table 3 : World's top 10 Importers of Unwrought Zinc with their shares in percentage.
- Annex- I : Top 3 sources of Unwrought Zinc of World's top 3 Importers.
- Table 4 : India's top 10 Export destination of Pig Irons with their shares in percentage.
- Table 5 : World's top 10 Exporters of Pig Irons with their shares in percentage.
- Table 6 : World's top 10 Importers of Pig Irons with their shares in percentage.
- Annex-II : Top 3 sources of Pig Irons of World's top 3 Importers.
- Table 7 : India's top10 Sources of Silicates with their shares in percentage.
- Table 8 : World's top 10 Importers Silicates with their shares in percentage.
- Table 9 : India's top 10 Sources of Machinenary for mfg of Plastics or Rubber products with their shares in percentage.
- Table 10 : World's top 10 Importers of Machinenary for mfg of Plastics or Rubber products with their shares in percentage.

EXPORT

Unwrought Zinc

Zinc is a chemical element with the symbol **Zn** and atomic number 30. Zinc is a slightly brittle metal at room temperature and has a shiny-greyish appearance when oxidation is removed. It is the first element in group 12 (IIB) of the periodic table. In some respects, zinc is chemically similar to magnesium: both elements exhibit only one normal oxidation state (+2), and the Zn^{2+} and Mg^{2+} ions are of similar size. Zinc is the 24th most abundant element in Earth's crust and has five stable isotopes. The most common zinc ore is sphalerite , a zinc sulfide mineral. The largest workable lodes are in Australia, Asia, and the United States.

Zinc is an essential trace element for humans, animals, plants and for microorganisms and is necessary for prenatal and postnatal development. It is the second most abundant trace metal in humans after iron and it is the only metal which appears in all enzyme classes. Zinc is also an essential nutrient element for coral growth as it is an important cofactor for many enzymes.

Zinc deficiency affects about two billion people in the developing world and is associated with many diseases. In children, deficiency causes growth retardation, delayed sexual maturation, infection susceptibility, and diarrhea. Enzymes with a zinc atom in the reactive center are widespread in biochemistry, such as alcohol dehydrogenase in humans.

Brass, an alloy of copper and zinc in various proportions, was used as early as the third millennium BC in the Aegean area and the region which currently includes Iraq, the United Arab Emirates, Kalmykia, Turkmenistan and Georgia. In the second millennium BC it was used in the regions currently including West India, Uzbekistan, Iran, Syria, Iraq, and Israel. Zinc metal was not produced on a large scale until the 12th century in India, though it was known to the ancient Romans and Greeks. The mines of Rajasthan have given definite evidence of zinc production going back to the 6th century BC. To date, the oldest evidence of pure zinc comes from Zawar, in Rajasthan, as early as the 9th century AD when a distillation process was employed to make pure zinc.

Zinc makes up about 75 ppm (0.0075%) of Earth's crust, making it the 24th most abundant element. Typical background concentrations of zinc do not exceed 1 μg/m^3 in the atmosphere; 300 mg/kg in soil; 100 mg/kg in vegetation; 20 μg/L in freshwater and 5 μg/L in seawater. The element is normally found in association with other base metals such as copper and lead in ores. Zinc is a chalcophile, meaning the element is more likely to be found in minerals together with sulfur and other heavy chalcogens, rather than with the light chalcogen oxygen or with non-chalcogen electronegative elements such as the halogens. Sulfides formed as the crust solidified under the reducing conditions of the early Earth's atmosphere.

Knowledge of how to produce brass spread to Ancient Greece by the 7th century BC, but few varieties were made. Ornaments made of alloys containing 80–90% zinc, with lead, iron, antimony, and other metals making up the remainder, have been found that are 2,500 years old. A possibly prehistoric statuette containing 87.5% zinc was found in a Dacian archaeological site.

Zinc is the fourth most common metal in use, trailing only iron, aluminium, and copper with an annual production of about 13 million tonnes. The world's largest zinc producer is Nyrstar, a merger of the Australian OZ Minerals and the Belgian Umicore. About 70% of the world's zinc originates from mining, while the remaining 30% comes from recycling secondary zinc.

Commercially pure zinc is known as Special High Grade, often abbreviated *SHG*, and is 99.995% pure. Worldwide, 95% of new zinc is mined from sulfidic ore deposits, in which sphalerite (ZnS) is nearly always mixed with the sulfides of copper, lead and iron. Zinc mines are scattered throughout the world, with the main areas being China, Australia, and Peru. China produced 38% of the global zinc output in 2014.

Zinc metal is produced using extractive metallurgy. The ore is finely ground, then put through froth flotation to separate minerals from gangue, to get a zinc sulfide ore concentrate consisting of about 50% zinc, 32% sulfur, 13% iron, and 5% SiO.

These are broadly classified under **H.S. Code-7901**.

Table - 1

India's Top 10 destination of Unwrought Zinc (H.S Code-7901)

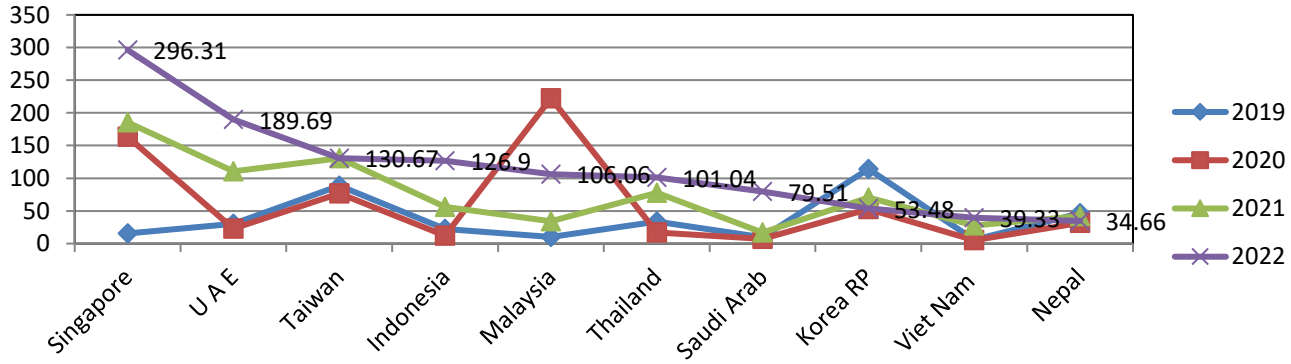
Rank	Countries	2019		2020		2021		2022	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	Singapore	15.33	2.94	163.26	24.32	185.51	22.66	296.31	22.60
2.	U A E	30.14	5.78	22.75	3.39	110.65	13.52	189.69	14.47
3.	Taiwan	88.37	16.95	76.74	11.43	130.80	15.98	130.67	9.96
4.	Indonesia	22.23	4.26	12.26	1.83	56.40	6.89	126.90	9.68
5.	Malaysia	10.04	1.93	222.37	33.13	34.34	4.19	106.06	8.09
6.	Thailand	33.64	6.45	17.09	2.55	77.96	9.52	101.04	7.71
7.	Saudi Arab	9.64	1.85	7.26	1.08	16.83	2.06	79.51	6.06
8.	Korea RP	114.21	21.90	52.73	7.86	70.58	8.62	53.48	4.08
9.	Viet Nam	5.77	1.11	5.14	0.77	27.90	3.41	39.33	3.00
10.	Nepal	46.17	8.85	31.54	4.70	41.96	5.13	34.66	2.64
	Others	145.85	27.97	60.11	8.96	65.78	8.04	153.67	11.72
	Total	521.37	100	671.26	100	818.72	100	1311.33	100

Source: DGCI&S.

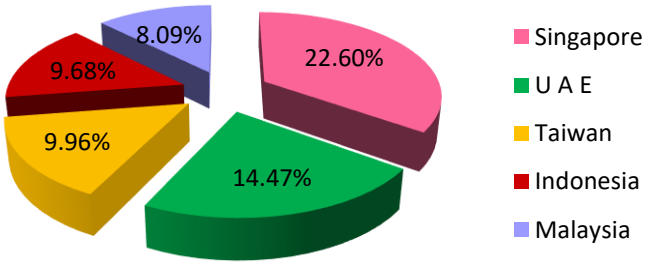
Note : India's Export including re-export

Leading importers of Unwrought Zinc from India for 2019-2022**(in million USD)**

Data label given on the basis of 2022



India's top 5 destinations of Unwrought Zinc by percentage India in 2022:



The total value of Unwrought Zinc export from India to around the world in year 2022 was almost US $ 1.31 Billion, which was the highest export value of Unwrought Zinc from India during the review period and it was almost 60.16% more than the year 2021. Singapore was the largest market for Unwrought Zinc export from India. In 2022, Singapore imported US $ 296.31 million worth Unwrought Zinc from India which was accounted 22.60% share of India's total export in 2022. It was followed by UAE (14.47%) and Taiwan (9.96%), These top 5 countries account for over 64.80% of the total Unwrought Zinc export from India.

Table-2

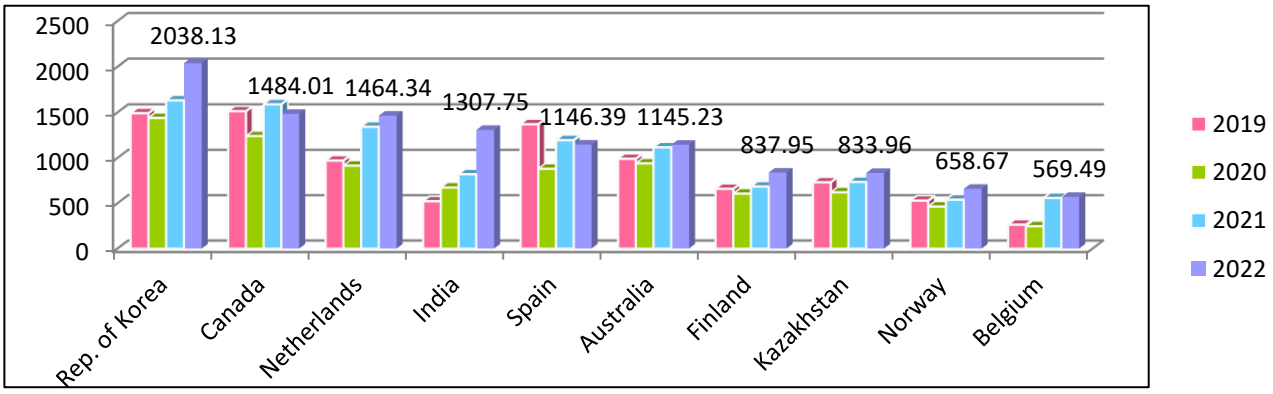
World's Top 10 exporter of Unwrought Zinc (H.S Code-7901)

Rank	Countries	2019		2020		2021		2022	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	Rep. of Korea	1491.53	11.34	1439.93	12.59	1632.52	11.45	2038.13	13.26
2.	Canada	1512.72	11.50	1240.42	10.85	1588.88	11.14	1484.01	9.65
3.	Netherlands	970.43	7.38	915.03	8.00	1343.37	9.42	1464.34	9.52
4.	**India**	**521.40**	**3.96**	**673.96**	**5.89**	**819.57**	**5.75**	**1307.75**	**8.51**
5.	Spain	1371.17	10.42	880.19	7.70	1196.12	8.39	1146.39	7.46
6.	Australia	990.32	7.53	939.35	8.22	1116.54	7.83	1145.23	7.45
7.	Finland	658.63	5.01	606.06	5.30	683.81	4.79	837.95	5.45
8.	Kazakhstan	730.56	5.55	620.75	5.43	734.41	5.15	833.96	5.42
9.	Norway	528.19	4.01	463.50	4.05	539.83	3.78	658.67	4.28
10.	Belgium	263.20	2.00	246.83	2.16	558.29	3.91	569.49	3.70
	Others	4118.34	31.30	3407.80	29.80	4050.45	28.40	3888.74	25.29
	Total	13156.48	100	11433.81	100	14263.79	100	15374.66	100

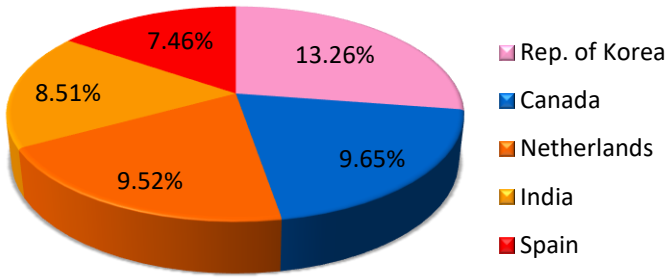
Source: UN Comtrade

Leading exporters of Unwrought Zinc of world from 2019 to 2022 **(Values in million USD)**

Data label given on the basis of 2022



Country wise world's leading exporter of Unwrought Zinc by percentage in 2022



In 2022, the world exports of Unwrought Zinc was more than US $ 15.37 billion. It was US $ 14.26 billion in the year 2021. Rep. of Korea has the highest export volume of Unwrought Zinc of any country, at about US $ 2.04 Billion, accounted 13.26% share of world export. The second largest Unwrought Zinc exporter**,** Canada, exported the same in that year at about US $ 1.48 Billion, which was accounted 9.65% of world export. Netherlands was the 3rd largest exporter of Unwrought Zinc n the world with 9.52% share. In that year **India** stood at 4th largest exporter of Unwrought Zinc in the world with 8.51 % share of world export.

Table-3

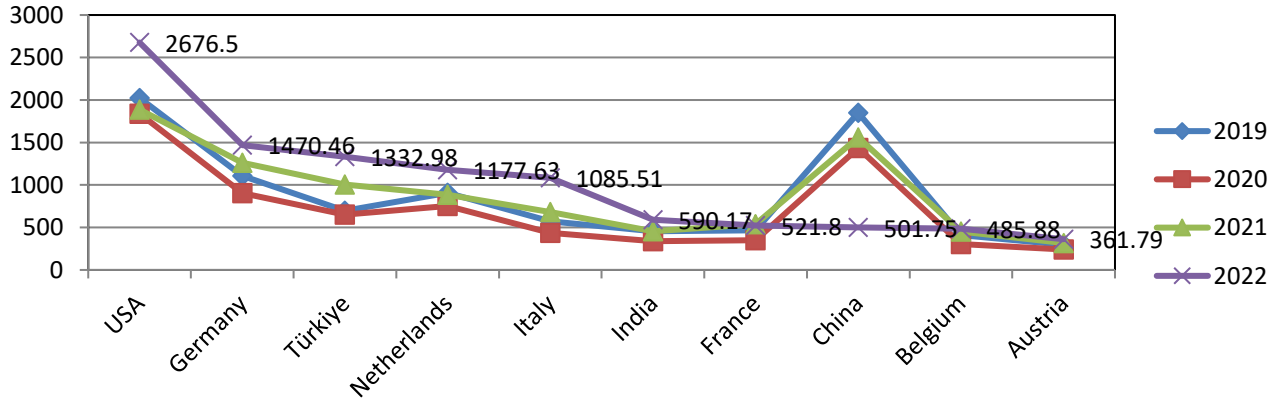
World's top 10 Importers of Unwrought Zinc (H.S Code-7901)

Rank	Countries	2019		2020		2021		2022	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	USA	2023.24	14.08	1839.53	15.03	1886.90	11.95	2676.50	19.72
2.	Germany	1107.57	7.71	905.39	7.40	1262.62	8.00	1470.46	10.83
3.	Türkiye	694.60	4.83	649.83	5.31	1006.37	6.38	1332.98	9.82
4.	Netherlands	908.04	6.32	754.22	6.16	883.09	5.59	1177.63	8.68
5.	Italy	572.57	3.99	437.81	3.58	681.61	4.32	1085.51	8.00
6.	**India**	**454.72**	**3.17**	**338.20**	**2.76**	**455.91**	**2.89**	**590.17**	**4.35**
7.	France	466.92	3.25	351.26	2.87	538.82	3.41	521.80	3.84
8.	China	1848.81	12.87	1435.52	11.73	1560.37	9.88	501.75	3.70
9.	Belgium	410.93	2.86	303.04	2.48	449.92	2.85	485.88	3.58
10.	Austria	296.53	2.06	240.74	1.97	317.00	2.01	361.79	2.67
	Others	5583.12	38.86	4982.46	40.71	6743.45	42.72	3368.93	24.82
	Total	14367.05	100	12238.00	100	15786.08	100	13573.40	100

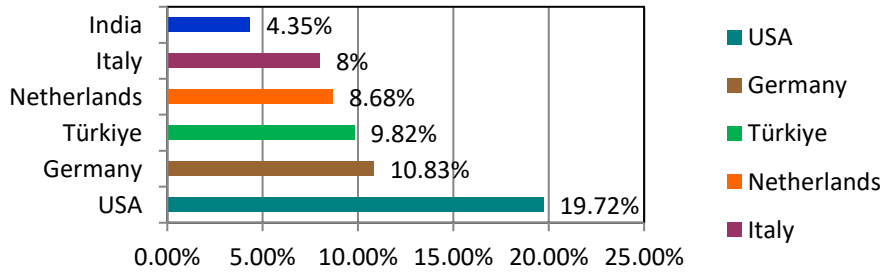
Source : UN Comtrade

Leading Unwrought Zinc importers of world from 2019 to 2022**(in million USD)**

Data label given on the basis of 2022



Country wise world's leading importers of Unwrought Zinc by percentage in 2022

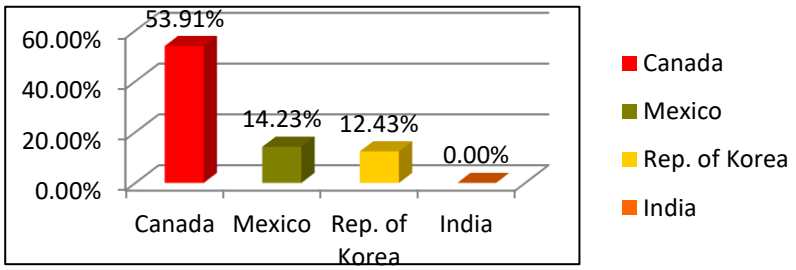


Global purchases of imported Unwrought Zinc cost a total US $ 13.57 billion in 2022. In that year, imported Unwrought Zinc depreciated by 14.02% from US $ 15.79 billion during 2021. From a major importing countries perspective, USA consumed the highest dollar worth of imported Unwrought Zinc during 2022 with purchases valued at US $ 2.68 billion or 19.72 % of the world total. In second and third place were Germany and Turkiye at 10.83% and 9.82% of globally imported Unwrought Zinc in 2022. In that year India stood at 6th largest importer of Unwrought Zinc in the world with 4.35% share of world import.

Annexure-1

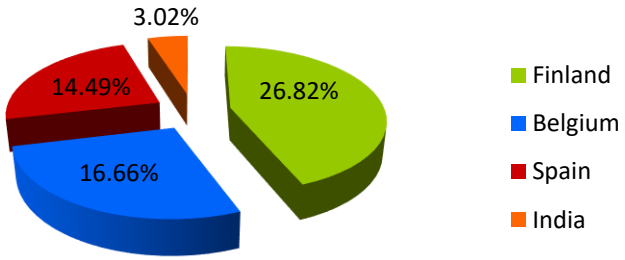
Top sources of world's top three importers of Unwrought Zinc (H.S Code-7901)

Top 3 Sources of Unwrought Zinc to USA in 2022 by percentage:



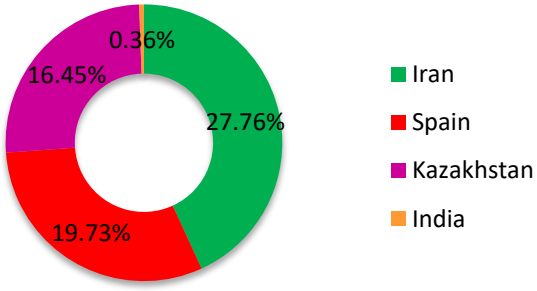
In 2022, USA imported 53.91% share of Unwrought Zinc from Canada. Mexico was the 2nd major source country of Unwrought Zinc to USA, exported 14.23% share of USA's total import of Unwrought Zinc . It was followed by Rep. of Korea, exported 12.43% share of Unwrought Zinc to USA in that year. In 2022 **India's** account was almost empty. **Source : UN Comtrade)**

ii) Top 3 Sources of Unwrought Zinc to Germany in 2022 by percentage**:**



In 2022 Germany imports most of its requirements of Unwrought Zinc from Finland with a share of 26.82% , 2nd and 3rd largest exporter of the commodity to Germany were Belgium with a share of 16.66% and Spain with a share of 14.49%. India's account was 3.02% share of Germany's total import of Unwrought Zinc in that year. **Source: UN Comtrade)**

iii) Top 3 Sources of Unwrought Zinc to Turkey in 2022 by percentage**:**



Turkey's 3 major source countries of Unwrought Zinc in 2022 were Iran (27.76%), Spain (19.73%) and Kazakhstan (16.45%). In that year India's export of Unwrought Zinc to Turkey was only 0.36% of Turkey's total import. **(Source: UN Comtrade).**

Pig Irons

Pig iron, also known as **crude iron**, is an intermediate good used by the iron industry in the production of steel, which is developed by smelting iron ore in a blast furnace. Pig iron has a high carbon content, typically 3.8–4.7%, along with silica and other constituents of dross, which makes it brittle and not useful directly as a material except for limited applications.

The traditional shape of the molds used for pig iron ingots is a branching structure formed in sand, with many individual ingots at right angles to a central channel or "runner", resembling a litter of piglets being nursed by a sow. When the metal had cooled and hardened, the smaller ingots (the "pigs") were simply broken from the runner (the "sow"), hence the name "pig iron". As pig iron is intended for remelting, the uneven size of the ingots and the inclusion of small amounts of sand are insignificant issues when compared to the ease of casting and handling.

Smelting and producing wrought iron was known in ancient Europe and the Middle East, but it was produced in bloomeries by direct reduction. Pig iron was not produced in Europe before the Middle Ages. The Chinese were making pig iron by the later Zhou dynasty (which ended in 256 BC). Furnaces such as Lapphyttan in Sweden may date back to the 12th century; and some in Mark (today part of Westphalia, Germany) to the 13th. It remains to be established whether these northern European developments derive from Chinese ones. Wagner has postulated a possible link via Persian contacts with China along the Silk Road and Viking contacts with Persia, but there is a chronological gap between the Viking period and Lapphyttan.

The phase transition of the iron into liquid in the furnace was an avoided phenomenon, as decarburizing the pig iron into steel was an extremely tedious process using medieval technology. Traditionally, pig iron was worked into wrought iron in finery forges, later puddling furnaces, and more recently, into steel. In these processes, pig iron is melted and a strong current of air is directed over it while it is stirred or agitated. This causes the dissolved impurities (such as silicon) to be thoroughly oxidized. An intermediate product of puddling is known as refined pig iron, finers metal, or refined iron.

Pig iron can also be used to produce gray iron. This is achieved by remelting pig iron, often along with substantial quantities of steel and scrap iron, removing undesirable contaminants, adding alloys, and adjusting the carbon content. Some pig iron grades are suitable for producing ductile iron. These are high purity pig irons and depending on the grade of ductile iron being produced these pig irons may be low in the elements silicon, manganese, sulfur and phosphorus. These types of pig iron are used to dilute all the elements (except carbon) in a ductile iron charge which may be harmful to the ductile iron process.

Until recently pig iron was typically poured directly out of the bottom of the blast furnace through a trough into a ladle car for transfer to the steel mill in mostly liquid form; in this state, the pig iron was referred to as *hot metal*. The hot metal was then poured into a steelmaking vessel to produce steel, typically an electric arc furnace, induction furnace or basic oxygen furnace, where the excess carbon is burned off and the alloy composition controlled. Earlier processes for this included the finery forge, the puddling furnace, the Bessemer process, and the open hearth furnace.

Modern steel mills and direct-reduction iron plants transfer the molten iron to a ladle for immediate use in the steel making furnaces or cast it into pigs on a pig-casting machine for reuse or resale. Modern pig casting machines produce stick pigs, which break into smaller 4–10 kg piglets at discharge

These are broadly classified under **H.S. Code-7201**.

Table - 4

India's Top 10 destination of Pig Irons (HS Code –7201)

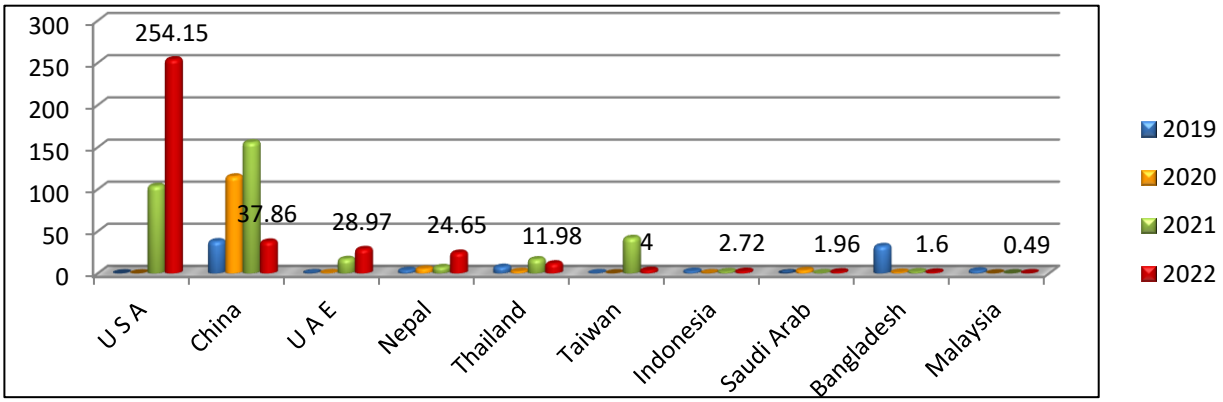
Rank	Countries	2019		2020		2021		2022	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	U S A	0.00	0.00	0.00	0.00	103.99	22.05	254.15	68.74
2.	China	38.26	40.53	115.33	87.07	155.88	33.05	37.86	10.24
3.	U A E	0.37	0.39	0.73	0.55	17.22	3.65	28.97	7.84
4.	Nepal	3.82	4.05	5.70	4.30	7.52	1.60	24.65	6.67
5.	Thailand	7.77	8.23	2.50	1.89	16.81	3.56	11.98	3.24
6.	Taiwan	0.45	0.48	0.20	0.15	42.17	8.94	4.00	1.08
7.	Indonesia	2.74	2.90	0.39	0.30	2.21	0.47	2.72	0.74
8.	Saudi Arab	0.32	0.34	3.81	2.88	0.53	0.11	1.96	0.53
9.	Bangladesh	32.53	34.45	1.38	1.04	2.12	0.45	1.60	0.43
10.	Malaysia	3.19	3.38	0.17	0.13	0.18	0.04	0.49	0.13
	Others	4.96	5.26	2.25	1.70	123.03	26.09	1.34	0.36
	Total	94.42	100	132.46	100	471.65	100	369.72	100

Source: DGCI&S

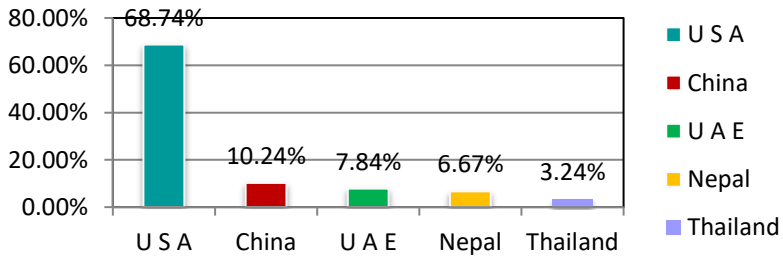
Note : India's Export including re-export

Destinations of Indian Pig Irons from 2019-2022**(Values in million USD)**

Data label given on the basis of 2022



India's top 5 major destinations of Pig Irons by percentage in 2022:



In the year 2022, the total export value of Pig Irons from India was US $ 369.72 Million and riches pick in the year 2021. USA was the largest destination of Pig Irons. from India in 2022. It has imported US $ 254.15 Million in 2022, accounted 68.74% share of India's total export. China and UAE stood at 2nd and 3rd largest destination of Pig Irons form India with10.24% and 7.84% share respectively of India's total export of the same in the same year. In the 2022 the India's export of Pig Irons has decreased by 21.62% compare to the year 2021.

Table - 5

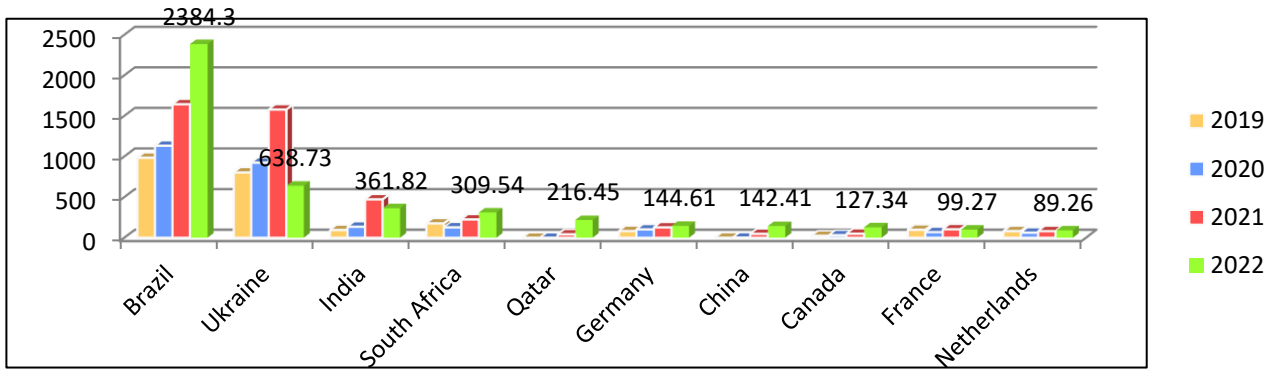
World's Top 10 exporters of Pig Irons (HS Code –7201)

Rank	Countries	2019		2020		2021		2022	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	Brazil	982.69	23.95	1130.67	25.35	1641.64	24.16	2384.30	49.59
2.	Ukraine	801.83	19.55	922.21	20.68	1576.71	23.20	638.73	13.28
3.	**India**	**94.33**	**2.30**	**134.69**	**3.02**	**471.06**	**6.93**	**361.82**	**7.53**
4.	South Africa	175.65	4.28	127.33	2.86	223.82	3.29	309.54	6.44
5.	Qatar	0.02	0.00	0.00	0.00	40.38	0.59	216.45	4.50
6.	Germany	81.69	1.99	101.10	2.27	126.19	1.86	144.61	3.01
7.	China	0.25	0.01	0.54	0.01	46.40	0.68	142.41	2.96
8.	Canada	23.41	0.57	30.05	0.67	47.98	0.71	127.34	2.65
9.	France	96.83	2.36	68.33	1.53	103.06	1.52	99.27	2.06
10.	Netherlands	80.56	1.96	61.37	1.38	80.17	1.18	89.26	1.86
	Others	1764.99	43.02	1883.72	42.24	2438.38	35.88	294.40	6.12
	Total	4102.27	100	4460.00	100	6795.80	100	4808.15	100

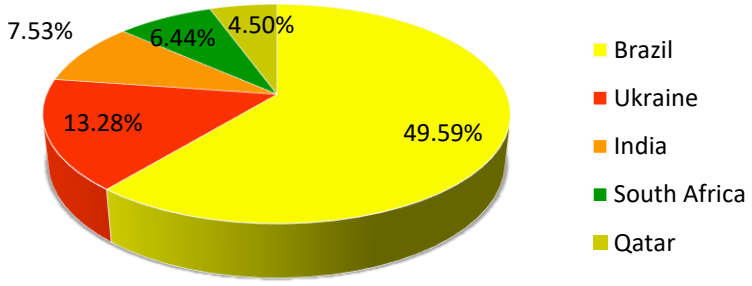
Source: UN Comtrade

Pig Irons of world from 2019 to 2022 **(Values in million $)**

Data label given on the basis of 2022



Country wise export trends of Pig Irons by percentage in 2022:



In 2022, the world imports of Pig Irons was US $ 4.81 billion. It was US $ 6.79 billion in 2021, shows the down of 29.25% from 2021. Brazil was the world's largest exporter of Pig Irons in the world over the review period, it has exported US $ 2.38 Billion of the commodity, which was accounted 49.59% share of world export in 2022. Which was Which was followed by Ukraine (13.28%). **India** has constitutes the 3rd largest exporter of Pig Irons in the world with 7.53% share of world's total export of Pig Irons in 2022.

Table - 6

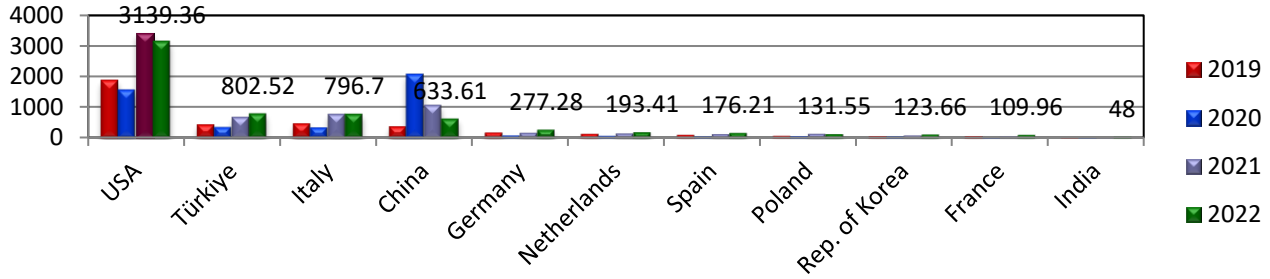
World's Top 10 Importers of Pig Irons (HS Code –7201)

Rank	Countries	2019		2020		2021		2022	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	USA	1862.43	38.21	1566.16	28.58	3418.11	43.66	3139.36	45.79
2.	Türkiye	445.70	9.14	369.59	6.75	676.06	8.64	802.52	11.70
3.	Italy	480.54	9.86	353.50	6.45	776.59	9.92	796.70	11.62
4.	China	389.19	7.99	2069.32	37.77	1051.81	13.44	633.61	9.24
5.	Germany	184.40	3.78	90.09	1.64	177.64	2.27	277.28	4.04
6.	Netherlands	139.10	2.85	83.95	1.53	159.14	2.03	193.41	2.82
7.	Spain	114.90	2.36	61.99	1.13	130.31	1.66	176.21	2.57
8.	Poland	85.49	1.75	73.32	1.34	138.98	1.78	131.55	1.92
9.	Rep. of Korea	69.50	1.43	56.97	1.04	89.63	1.14	123.66	1.80
10.	France	69.94	1.44	44.03	0.80	63.58	0.81	109.96	1.60
12.	**India**	**10.09**	**0.21**	**4.67**	**0.09**	**8.35**	**0.11**	**48.00**	**0.70**
	Others	1022.50	20.98	705.79	12.88	1138.10	14.54	424.15	6.19
	Total	4873.78	100	5479.38	100	7828.29	100	6856.43	100

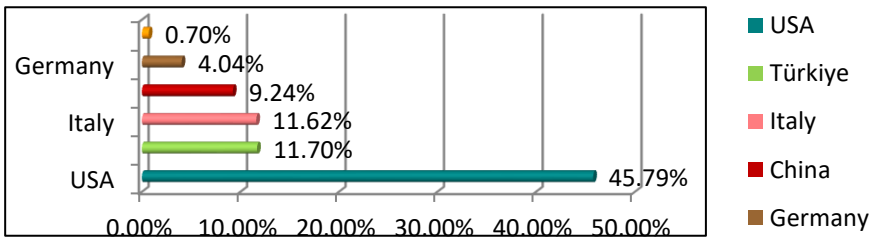
Source :UNComtrade

Pig Irons importers of world from 2019 to 2022 **(Values in million USD)**

Data label given on the basis of 2022



Country wise import trends of Pig Irons by percentage in 2022

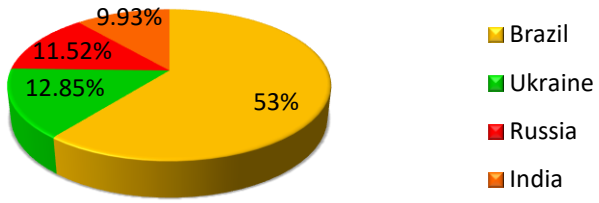


The value of global imports of Pig Irons totalled US $ 6.86 Billion in 2022. Which was decreased by nearly 12.42% than previous year. With the value of US $ 7.83 Billion the world export of Pig Irons reaches picked in the year 2021. USA represented the major importer of Pig Irons in the world, recording US $ 3.14 Billion, which was 45.79% of total global imports in 2022, followed by Turkiye (11.70%) and Italy(11.62%) . **India** represented the 12th largest importer of Pig Irons in the world in 2022 with 0.70% share of world import.

Annexure-II

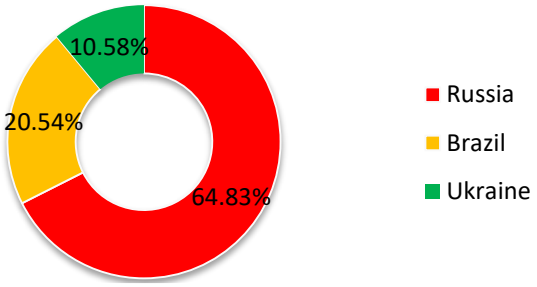
Major sources of world's top three importers of Pig Irons (HS Code –7201)

(i) Top 3 Sources of Pig Irons to USA in 2022 by percentage:



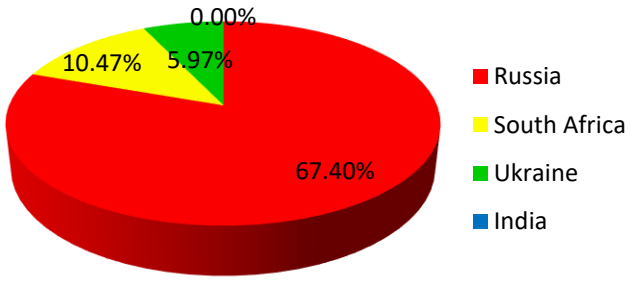
Brazil was the principle source country of Pig Irons to USA in 2022. USA imported over 53% of the commodity from Brazil, it was followed by Ukraine (12.85%) and Russia (11.52%). In that year India exported 9.93% share of USA's total import. **(Source: UN Comtrade)**

(ii) Top 3 Sources of Pig Irons to Turkiye in 2022 by percentage**:**



Turkiye's 3 major source countries of Seeds of Pig Irons in 2022 were Russia (64.83%), Brazil (20.54%) and Ukraine (10.58%) in 2022. In that year India has no trade to Turkiye. **(Source: UN Comtrade)**

(iii) Pig Irons Top 3 Sources of Pig Irons to Italy in 2022 by percentage**:**



Almost 67.40% of Pig Irons imports of Italy came from Russia in 2022 which was followed by South Africa (10.47 %) and Ukraine (5.97%). In this year there was almost no export of Pig Irons from India to Italy. **(Source : UN Comtrade).**

IMPORT

Silicates; Commercial Alkali Metal Silicates

Silicates are the minerals containing silicon and oxygen in tetrahedral SiO_4^{4-} units, which are linked together in several patterns. About 95% of the earth's crust is composed of silicate minerals, aluminosilicate clays or silica.

For diverse manufacturing, technological, and artistic needs, silicates are versatile materials, both natural (such as granite, gravel, and garnet) and artificial (such as Portland cement, ceramics, glass, and waterglass).

n most silicates, silicon atom occupies the center of an idealized tetrahedron whose corners are four oxygen atoms, connected to it by single covalent bonds according to the octet rule.[1] The oxygen atoms, which bears some negative charge, link to other cations (M^{n+}). This Si-O-M-O-Si linkage is strong and rigid, which properties are manifested in the rock-like silicates. The silicates can be classified according to the length and crosslinking of the silicate anions.

Silicates with alkali cations and small or chain-like anions, such as sodium ortho- and metasilicate, are fairly soluble in water. They form several solid hydrates when crystallized from solution. Soluble sodium silicates and mixtures thereof, known as waterglass are in fact important industrial and household chemicals. Silicates of non-alkali cations, or with sheet and tridimensional polymeric anions, generally have negligible solubility in water at normal conditions.

Silicates are generally inert chemically. Hence they are common minerals. Their resiliency also recommends their use as building materials.

When treated with calcium oxides and water, silicate minerals form Portland cement.

Equilibria involving hydrolysis of silicate minerals are difficult to study. The chief challenge is the very low solubility of SiO_4^{4-} and its various protonated forms. Such equilibria are relevant to the processes occurring on geological time scales. Some plants excrete ligands that dissolve silicates, a step in biomineralization.

Silicates are extremely important in the cement, ceramic and glass industries. Quartz is another example of silicates with an ideal capability to give a high rhythmic frequency vibration. These characteristics make quartz crystals to be used in radios, pressure gauges, and watches.

Microchips are a form of silicon cut down to small proportions that have controlled printed orders through photographic procedures. Silicate has unique properties, for instance, producing thermal insulation, conduct electricity, provide an elevated frequency vibration, and is capable of conducting electricity. The most central component of silicates is silicon. The crystal is very strong and can be cut into minuscule sizes, thus can conduct electricity. These properties make silicon the best material to create microchips that pass through computers, mobile phones, and gaming devices.

Glass is made from silicates. It is among the major and most productive uses of silicates. follow the procedure, formless, and hard material such as clay or sand is burned to high temperatures. The material formed after heating is malleable, which can make glasses for drinking.

These are broadly classified under **H. S. Code- 2839**.

Table - 7

India's Top 10 Sources of Silicates (HS Code : 2839)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	U A E	8.61	57.85	16.15	75.64	14.48	69.47	9.85	55.03
2.	China	2.02	13.54	1.40	6.58	1.66	7.97	2.01	11.23
3.	U S A	0.58	3.89	0.48	2.26	0.71	3.41	1.25	6.97
4.	Belgium	0.61	4.08	0.72	3.39	1.14	5.49	1.24	6.93
5.	Malaysia	0.02	0.16	0.50	2.34	0.58	2.79	0.80	4.45
6.	Japan	0.53	3.53	0.22	1.04	0.55	2.63	0.71	3.98
7.	Thailand	0.09	0.62	0.02	0.11	0.08	0.38	0.46	2.59
8.	Netherland	0.69	4.65	0.55	2.56	0.44	2.10	0.43	2.42
9.	Germany	1.04	6.98	0.44	2.08	0.25	1.21	0.43	2.38
10.	Sweden	0.14	0.95	0.13	0.60	0.22	1.06	0.21	1.18
	Others	0.56	3.74	0.73	3.41	0.73	3.50	0.51	2.84
	Total	14.89	100	21.36	100	20.84	100	17.90	100

Source: **DGCI&S**

Note : India's Import including Re-import

The above data indicates that India's import of Silicates has decreased to US $ 17.90 million in 2022 from US $ 20.84 million in 2021, which shows a negative growth of (-) 14.11% from the previous year's import i.e. in 2021. In the year 2022 India's major sources of Silicates were UAE (US $ 9.85 Million), China (US $ 2.01 Million) and USA (US $ 1.25 Million) value of Silicates import into India which shows nearly 73.23% of total import value of Silicates imported by India from these 3 countries in 2022.

Table - 8

World Top 10 Importer of Silicates (HS Code : 2839)

Rank	Countries	2018		2019		2020		2021	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	USA	48.58	7.00	41.78	6.44	68.28	8.11	80.09	9.78
2.	Germany	44.80	6.46	42.17	6.50	53.50	6.36	79.16	9.67
3.	Netherlands	29.85	4.30	32.45	5.00	63.08	7.50	64.88	7.93
4.	Rep. of Korea	40.48	5.84	34.92	5.38	48.30	5.74	54.49	6.66
5.	Japan	37.83	5.45	28.51	4.39	38.70	4.60	45.69	5.58
6.	France	28.92	4.17	27.66	4.26	35.80	4.25	36.74	4.49
7.	Türkiye	16.00	2.31	15.79	2.43	18.76	2.23	32.52	3.97
8.	Canada	16.84	2.43	14.98	2.31	22.54	2.68	26.09	3.19
9.	Italy	22.86	3.30	20.20	3.11	27.98	3.32	25.88	3.16
10.	China	16.98	2.45	15.73	2.42	22.11	2.63	25.37	3.10
13.	**India**	**14.89**	**2.15**	**21.41**	**3.30**	**20.96**	**2.49**	**17.91**	**2.19**
	Others	375.66	54.15	353.64	54.47	421.52	50.09	329.83	40.29
	Total	693.70	100	649.24	100	841.51	100	818.64	100

Source :UN Comtrade

The worth value of Global import of Silicates was nearly US $ 818.6 million in 2022 which was down by 2.72 % from the year 2021. USA has became the world's largest importer of Silicates among world's largest importers. Imports 9.78% share of world's import of Silicates in 2022 followed by Germany (9.67%) and Netherland (7.93%). In the same year **India**'s imports of Silicates was US $ 17.91 million and its share in the world-wide export market of this product was 2.19 % of total world import trade value of Silicates and ranked in 13th position in the world.

Machinary for Mfg. of Plastics or Rubber Product

The general term for various machinery and devices used in the plastics processing industry. Certain general-purpose machinery and equipment such as fluid and solid conveying, separation, crushing, grinding, and drying also occupy an important position in the plastics processing industry, so they are often listed as plastic machinery. Common types are plastic machinery, extruder machine, injection molding machine, film blowing machine, blow molding machine, etc.

According to the production process of plastic products, plastic machinery can be divided into four categories: plastic compounding machinery, plastic molding machinery, plastic secondary processing machinery, and plastic processing auxiliary machinery or devices. Plastic compounding machinery is used in the manufacture of various forms of plastic compounding materials, including kneaders, plastic mixing machines (open mills and internal mixers), pelletizers, screening machines, crushers, and grinders. Plastic molding machinery, also known as plastic primary processing machinery, is used for the molding of plastic semi-products or products, including compression molding machines, injection molding machines, extruders, blow molding machines, calenders, rotational molding machines, foaming machines, etc. Plastic secondary processing machinery is used for reprocessing and post-processing of plastic semi-products or products, including thermoforming machines, welding machines, heat sealing machines, hot stamping machines, vacuum evaporation machines, flocking machines, printing machines, etc. Metal processing machine tools are also commonly used for secondary processing of plastics. Plastic processing auxiliary machinery or devices are used to rationalize the plastic processing process, including automatic metering and feeding device, automatic scrap recycling device, automatic injection molding product removal device, injection mold quick replacement device, injection mold cooling machine, automatic thickness measurement device, and raw materials transportation and storage equipment, etc. Such auxiliary machinery or devices have become an indispensable part of modern plastic processing automation.

The perfection of plastic machinery directly affects the quality, output, and cost of plastic semi-products or products, so it must be able to adapt to changes in temperature and stress during plastic compounding and processing, as well as the resulting changes in the properties of molten materials, and to adapt to chemical corrosion and special conditions such as mechanical wear. The specialization of plastic grades, the development of engineering plastics, the emergence of composite materials, the development of large-scale, lightweight, and thin-walled plastic product structures require plastic machinery to achieve: complete sets for product production purposes; high-speed, labor-saving, Automation to improve the production efficiency of products; to ensure the precision of product specifications and quality with the smallest error; low energy consumption, less space, easy and safe operation, and maintenance.There are so many Machines for manufacturing of plastics or rubber products in the world, but most commonly Machine for the same is Injection Moulding Machines.
Injection moulding (U.S. spelling: injection molding) is a manufacturing , process for producing parts by injecting molten material into a mould, or mold.Injection moulding is used to create many things such as wire spools, packaging, bottle caps, automotive parts and components, toys, pocket combs, some musical instruments (and parts of them), one-piece chairs and small tables, storage containers, mechanical parts (including gears), and most other plastic products available today. Injection moulding is the most common modern method of manufacturing plastic parts; it is ideal for producing high volumes of the same object.

Rubber injection molding is very similar to the more well-known plastic injection molding process. It starts with the uncured rubber strips that go into the machine via a hopper. Once through the hopper, it enters the screw chamber, where it is heated and compressed by external heaters and friction from the movement of the screw.Near the end of the screw, the rubber has heated to a very fluidic state. It is fed into the mold at high pressure and it fills up the cavity built inside the rubber mold. Due to its flow properties, the rubber material fills every nook and cranny of the cavity.The mold then gradually cools down so the rubber solidifies. Finally, the mold opens to eject the end product, after which it is ready for the next cycle.

These are broadly classified under **H. S. Code 8477.**

Table - 7

India's Top 10 Sources of Machinenary for mfg of Plastics or Rubber products (HS Code :8477)

Rank	Countries	2019		2020		2021		2022	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	China	416.08	29.66	263.47	33.59	377.49	30.50	492.86	35.99
2.	Germany	263.12	18.76	122.40	15.61	322.25	26.03	362.88	26.50
3.	Italy	82.51	5.88	85.12	10.85	87.07	7.03	106.41	7.77
4.	Taiwan	70.64	5.04	43.40	5.53	65.37	5.28	83.90	6.13
5.	Japan	180.35	12.86	63.58	8.11	98.95	7.99	68.24	4.98
6.	U S A	56.39	4.02	32.25	4.11	46.23	3.73	46.29	3.38
7.	Korea RP	56.99	4.06	22.31	2.84	20.63	1.67	26.23	1.92
8.	Netherland	46.40	3.31	9.04	1.15	36.54	2.95	22.18	1.62
9.	Belgium	6.80	0.48	8.04	1.03	16.10	1.30	20.71	1.51
10.	U K	18.77	1.34	14.89	1.90	18.23	1.47	18.81	1.37
	Other	204.75	14.60	119.87	15.28	148.97	12.03	120.79	8.82
	Total	1402.79	100	784.37	100	1237.84	100	1369.30	100

Source: **DGCI&S**

Note : India's Import including re-import

There are somany countries India imports Machinenary for mfg of Plastics or Rubber products from. The Machinenary for mfg of Plastics or Rubber products import in 2022 stood at US $ 1.37 Billion and US $ 1.24 Billion in 2021, which shows a growth of more than 10.62% from the 2021 of India's import value of Machinenary for mfg of Plastics or Rubber products. Major three source countries of Machinenary for mfg of Plastics or Rubber products to India in 2022 were China (492.86 Million), Germany (US $ 362.88 Million) and Italy (US $ 106.41 Million). These 3 countries in total sold US $ 962.15 Million value of Machinenary for mfg of Plastics or Rubber products to India which rounds up to 70.26% of the total Aircraft Parts import into India.

Table - 8

World Top Importer of Machinenary for mfg of Plastics or Rubber products (HS Code :8477)

Rank	Countries	2019		2020		2021		2022	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	USA	3233.21	12.21	3056.31	13.06	3560.40	12.57	3597.50	16.06
2.	China	2957.30	11.17	2767.21	11.83	3381.55	11.94	3178.31	14.19
3.	Mexico	1222.47	4.62	973.27	4.16	1220.98	4.31	1526.77	6.82
4.	Germany	1426.33	5.39	1259.90	5.38	1574.00	5.56	1416.45	6.33
5.	**India**	**1403.62**	**5.30**	**782.33**	**3.34**	**1238.79**	**4.37**	**1362.26**	**6.08**
6.	Italy	624.25	2.36	508.59	2.17	793.80	2.80	776.65	3.47
7.	Türkiye	441.21	1.67	602.75	2.58	684.30	2.42	727.97	3.25
8.	Poland	527.08	1.99	515.86	2.20	639.18	2.26	637.95	2.85
9.	Canada	641.28	2.42	615.47	2.63	630.07	2.22	609.19	2.72
10.	Austria	442.64	1.67	439.57	1.88	517.39	1.83	581.86	2.60
	Others	13563.45	51.22	11879.02	50.76	14084.75	49.73	7978.78	35.63
	Total	26482.85	100	23400.28	100	28325.20	100	22393.69	100

Source :**UNComtrade**

Global Imports of Machinenary for mfg of Plastics or Rubber products, the top five importers in 2022 were U S A (US $ 3.60 B), China (US $ 3.18 B), Mexico (US $ 1.53 B), Germany (US $ 1.42 B) and **India** (US $ 1.36 B), accounted for 16.06%, 14.19%, 6.82%, 6.33 % and 6.08 % respectively of world import value of Machinenary for mfg of Plastics or Rubber products. In 2022 the global import of Machinenary for mfg of Plastics or Rubber products was US $ 22.39 Billion which was decreased by US $ 5.93 Billion from the year 2021.