IMPORT SUBSTITUTION OPPORTUNITIES REVIVING PAKISTAN'S STEEL INDUSTRY

The Federation of Pakistan Chambers of Commerce & Industry

Policy Advisory Board

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LIST OF ACRONYMS

CAGR	Compound Annual Growth Rate
CRC	Cold Rolled Coil
EAF	Electric Arc Furnace
EBS	Export Bonus Scheme
EBV	Export Bonus Voucher
EIF	Electric Induction Furnace
ETSAP	Energy Technology System Analysis Performance
FATA	Federally Administered Tribal Area
GDP	Gross Domestic Product
GST	General Sales Tax
HRC	Hot Rolled Coil
IS	Import Substitution
MT	Metric ton
MVA	Manufacturing Value Added
NSAC	National Steel Advisory Council
PBS	Pakistan Bureau of Statistics
PSM	Pakistan Steel Mills
USMCA	US-Mexico Canada Agreement

EXECUTIVE SUMMARY

Protectionism and anti-globalization sentiments have picked momentum in the post Brexit and US-China trade war era. The disruption in the global supply chain in the recent pandemic has led countries to rethink more on regionalism and inward-looking trade policies. Pakistan is facing consistent balance of payment difficulties for the past few decades coupled with an increasing trade deficit and currency depreciation. Pakistan's tariff structure relative to the economic growth, manufacturing, industry, and agriculture value-added for the past four decades (1980-2020) has been analyzed in the report. Policy instruments used for tariff liberalization cushioned trade deficit. In the year 1999, Pakistan's weighted average tariff was 43 percent which declined to 17.5 in 2005 and to 8.95 percent in 2019. The graphical analysis also explains tariff liberalization has a detrimental effect on economic growth and key economic sectors while Pakistan's trade deficit tends to increase with tariff liberalization.

The present report highlights the opportunities for import substitution in key sectors to inhibit the pace of the outflow of dollars. We have selected sectors that constitute a significant share of our imports, and have domestic production but are unable to meet the domestic demand. Around 18.3 USD billion of annual imports are targeted to evaluate import substitution opportunities. We have considered petroleum, steel and iron scrap, raw cotton, and oilseeds for exploring import substitution opportunities in our series of reports. The combined savings of USD 10.5 billion can be achieved within a time span of 6 years by adopting sector-wise import substitution policies. The report also purposes an import substitution cum export promotion model for industrialization in Pakistan.

The current series highlights import substitution opportunities by utilizing domestic iron ore and reviving the Pakistan steel mills. Pakistan's reliance on imported raw materials for the steel industry is increasing steadily. Total production during 2016-17 was around 7.7 million tons having an import dependency of 55 percent which contains imports of 4.2 million tons including steel scrap and intermediary goods. In 2020-21, import dependency increased to 67 percent as production enhances to 8 million tons having imports of 5.5 million tons (Scrap and intermediary goods). Average imports for the last 4 years in value were USD 3.6 billion having a contribution of 7 percent in total imports..

Higher imports of steel scrap have become a major concern as they continue to drive the widening of the trade gap. Iron ore has always been used as a raw material in making iron and steel. Iron ore reserves in the country are around 1,000 million tons with an annual

production of 0.6 million tons with utilization of 0.10 percent. Production of iron ore is decreasing for the last 3 years with a decline of 18 percent year on year. In the year 2020-21, imports of steel scrap stood at USD 1.9billion in value and 4.7million tons in volume. Substituting imported steel scrap from local iron ore can save USD 1.9 billion on annual basis. To substitute 4,7 million tons of steel scrap from iron ore, investment of around USD 700 million will be required to produce Pig Iron by installing blast furnace technology. The investment amount is based on the estimation derived from the fresh investment done by China in the Steel Industry which is producing Pig Iron. ***The local iron ore is cheaper than the imported scrap in USD terms by 70 percent and in PKR terms by 60 percent***. This reflects the cheap availability of raw iron ore in the country which could be utilized as a raw material in the steel industry against the expensive steel scrap.

However, to utilize iron ore as raw material, this required blast furnace technology is currently available at Pakistan Steel Mills and Tuwariqi Steel Mill. Pakistan steel mill capacity for long and flat products is around 550,000 tons for each product per annum. The capacity can be enhanced to 3 million tons in total with 1.5 million tons enhancement for each long and flat product. Flat products consist of hot rolled coils and cold rolled coils which are mostly used in automobile and appliances sector. H.R coils and C.R coils were mostly imported in Pakistan. In the last 5 years, 2.8 million tons of H.R and C.R coils are imported annually having an imported value of USD 1.8 billion. Pakistan steel had manufacturing H.R and C.R Coil for a long time but its closure increased import dependency for the steel sector. The installed production capacity of Pakistan steel mills in flat products is 550,000 tons which if operationalized can reduce import dependency on H.R coils and C.R coils with annual savings in imports of USD 250 million. However, as per PSMC Stakeholders Group with a new investment of USD 300million, the capacity could be enhanced to more than 1 million tons. Increased capacity to 1 million tons with a 90 percent utilization rate can save USD 600 million annually.

Strategies that need to be considered for import substitution include; Incentivize the use of Iron Ore through tax rebates; Joint collaboration between miners for mechanized mining; Raising the export duty on iron ore; Reviving Pakistan steel mills and merging Pakistan steel mills with Tuwairqi steel; Incentivize backward linkages of the steel industry; Develop national mining policy in collaboration with the provinces; Gas should be replaced with local coal to flame the blast furnace.

1. INTRODUCTION

Protectionism and anti-globalization sentiments have gained momentum in the world ever since the global financial crisis, the rise of the US and China trade war, Brexit, and the recent US-Mexico Canada (USMCA) agreement[1]. The disruption in the global supply chain in the recent pandemic has led countries to rethink more on regionalism and inward-looking trade policies. Besides this modern form of import substitution (IS), the idea was much popular in the post-world war era[2] when countries suffered from the shortage of foreign exchange and low availability of manufactured goods exports from industrialized countries. Thus, developing countries followed the dual policy objective of building their national industries and protecting national sovereignty. Developing countries such as East Asia, South East Asia, and Latin American economies adopted IS policies in the 1950s and 1960s with varying experiences. However, IS was soon lifted from the world with the emergence of the Washington consensus that favored trade and financial liberalization and a free-market economy.

Certain policy instruments have been devised to implement IS such as; tariff and non-tariff measures, quantitative restrictions, tax breaks, subsidies, and government loans. Other long-term measures include investment in education, infrastructure, and research for industries. Proponents of IS-based industrialization believe in the notion of "learning by doing" while those in favor of trade liberalization consider it a tool for technological and knowledge transfer. Raul Prebisch (1950) presented the import substitution theory based on countries that export primary (raw) products and import manufactured final goods. His study showed that developing countries' terms of trade will always be worsening if they keep on exporting raw materials in exchange for value-added goods. Productivity enhancement in primary products will only benefit those, producing final goods. Prebisch also emphasized the role of government in protecting the infant industries.

Rodrik (2016), highlights some of the reasons for premature de-industrialization experienced by developing countries in their transition from tariff protection to liberalization. Firstly, without building their manufacturing firms to have a comparative advantage in the world market they opened them to foreign competition. Thus, developing countries became a net importer of goods for which an import substitution process was initiated, reversing the process. Secondly, relative prices of manufactured goods declined because of developed countries' comparative advantage and relocation of manufacturing bases to other locations. Only those countries survived these low prices that were at a better stage of comparative advantage in their production.

1.1. Rise and Fall of Import Substitution in Pakistan

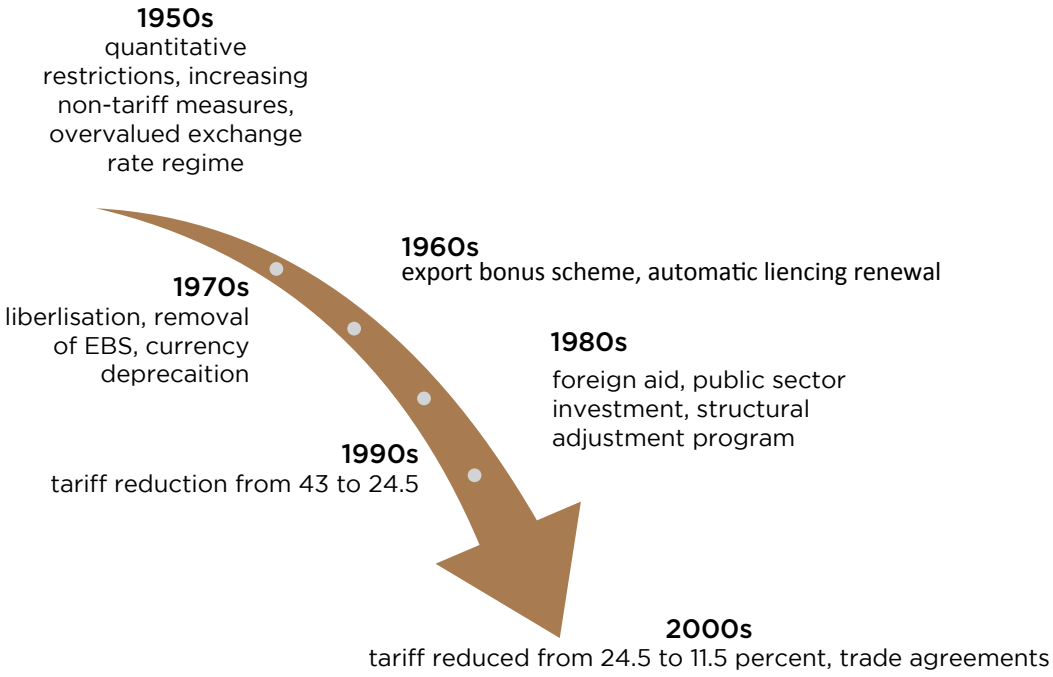
Pakistan adopted an import substitution policy in the 1950s by employing quantitative restrictions, increasing non-tariff measures, and by applying overvalued exchange rate regime. The basic objective was to promote industrialization and reduce the burden on the balance of payment. In the 1960s, Pakistan adopted an export growth strategy along with

[1]USMCA agreement aims to empower North Americans by increasing their reliance on their domestic industry instead of relying on other regions of the world. Only 10% of goods traded are allowed to be outsourced from other regions. Secondly, increasing labor wages to the level of the US as to restrict US companies' movement and maintaining the level playing field for all member parties.

[2]Most of the developed countries were colonizers with a strong industrial base, they used their colonies to extract raw material and made them dependent on their exports of final manufactured goods. This not only built colonizers' industrial base but also deteriorated the potential of their colonies' industrial structure. In the post-world war era, most of the developing countries adopted import substitution to promote industrialization and to protect their national sovereignty.

import substitution by initiating an export bonus scheme (EBS) for exporters. The policy favored a multiple exchange rate regime with controlled imports while incentivizing exporters through EBS, as they were allowed to import consumer goods, raw materials, and capital goods subsidized by Export Bonus Vouchers (EBV)[3]. Automatic renewal of import licensing[4] for raw material and consumer goods import was also a step towards trade liberalization. In the 1960s share of the manufacturing value-added contribution in the GDP and manufactured exports increased. The private sector and businesses were supported. Later in the 1970's trade liberalization, policies were applied by eliminating the EBS and promoting currency depreciation. Nationalization and public sector investment in large-scale manufacturing surged in this era. Cement, oil refineries, fertilizers, and other heavy industries were nationalized.

In the 1980s, public sector investment, foreign aid, tariff reduction, and structural adjustment program further added the trade liberalization measures. In the 1990s, Pakistan significantly reduced its maximum tariff rate to 45 percent from 225 (1986-87). While Pakistan's weighted average tariff was cut down to 16.5 percent in 2002.



In the subsequent sub-section, we have analyzed Pakistan's tariff structure relative to the economic growth, manufacturing, and industry value added for the past four decades.

1.2. Pakistan's Economic Growth and Tariff Liberalization (1980-2020)

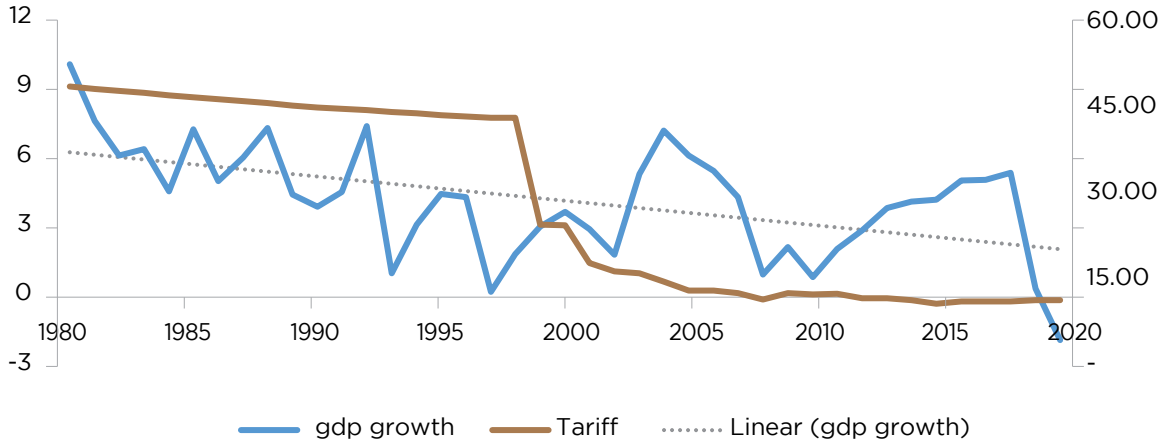
Pakistan's economic growth experienced fluctuating trend since the 1980s. A structural adjustment program was initiated in the 1988s that aimed to increase economic growth through trade liberalization. The figure explains the negative trend of Pakistan's economic growth as the weighted average tariff tends to decrease, indicating trade liberalization has a detrimental effect on economic growth. Pakistan's economic growth follows fluctuating trends since the 1980s. From 1980 to the 90s, Pakistan's average economic growth was

[3]EBV was used to obtain foreign exchange that can be used for importing goods, business travels and opening/ running their foreign commercial offices. EBV was transferable and priced according to market conditions

[4]Under the import licensing scheme selected industries were on the list of automatic renewal. This was essentially based on their export performance

recorded as 6.3 percent which narrowed to 3.9 percent in the next decade (1991-2000). From 2001 to 2010, Pakistan's economy grew on average at the rate of 4.2 percent with a reduction of 3.2 percent in the next decade.

Figure 1.1: Pakistan's Economic Growth and Tariff Liberalization (1980-2020)

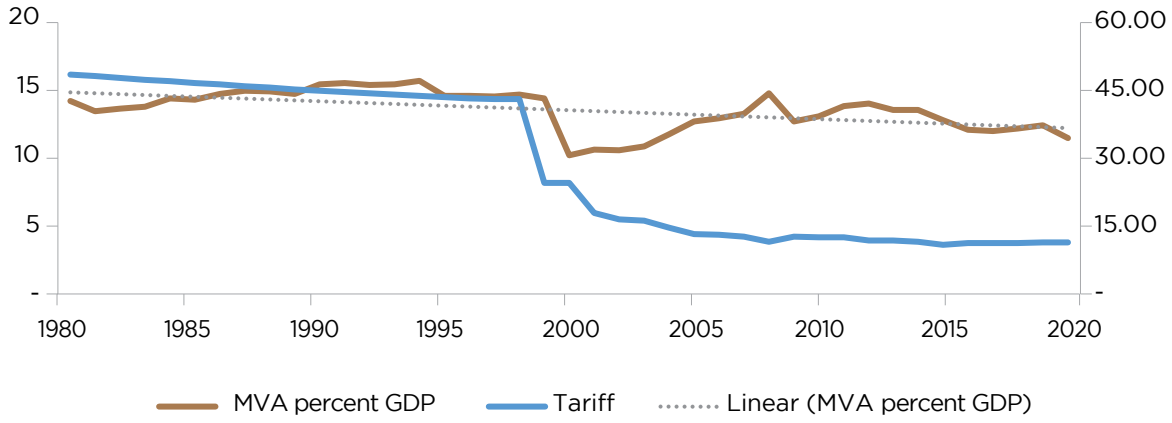


Source: World Bank, WITS database (2020) , Misc Sources

1.3. Pakistan's Manufacturing Value-added and Tariff Liberalization (1980-2020)

Pakistan's manufacturing value added (MVA) share in GDP is negatively affected by trade liberalization. In 1980, MVA's contribution to the GDP was 14 percent which declined to 11 percent in 2020. CAGR for the past four decades shows that each year MVA declined by 0.5 percent. Tariff structure in Pakistan was reduced rapidly in the 1990s while the manufacturing industry's pace to restructure was slow. Tariff was an important source of revenue generation for the government. Reduction in the tariffs, added an additional burden for the government thus no proper financial support was granted to the manufacturing sector. The interest rate was also kept high to ease the fiscal burden on the government which also reduced the credit availability for manufacturing firms. All these measures led to de-industrialization in Pakistan.

Figure 1.2: Pakistan's Manufacturing Value Added (% of the GDP) and Tariff Liberalization (1980-2020)

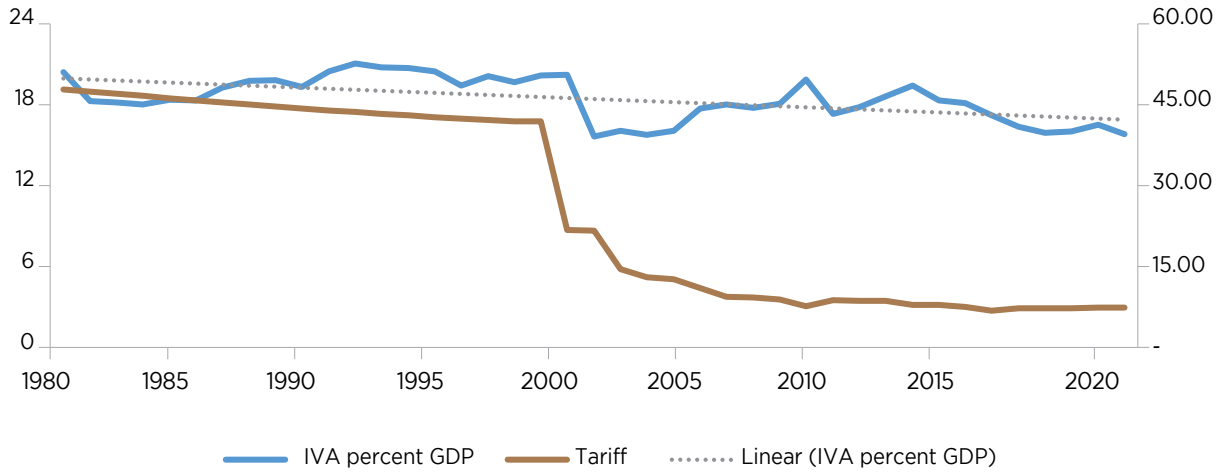


Source: World Bank, WITS database (2020), Misc Sources

1.4. Pakistan's Industry Value Added and Tariff Liberalization (1980-2020)

Industry value-added contribution to the GDP also declined amid rapid trade liberalization measures. In 1980, Pakistan's contribution to the industry stood at 22.3 percent while in 2020 industry value-added declined to 17.7 percent. During the last four decades, contribution to the GDP declined by a CAGR of 0.6 percent per year. The process of de-industrialization kicked off as trade liberalization gained momentum (see figure below: 1.3).

Figure 1.3: Pakistan's Industrial Value Added (% of the GDP) and Trade Liberalization (1980-2020)

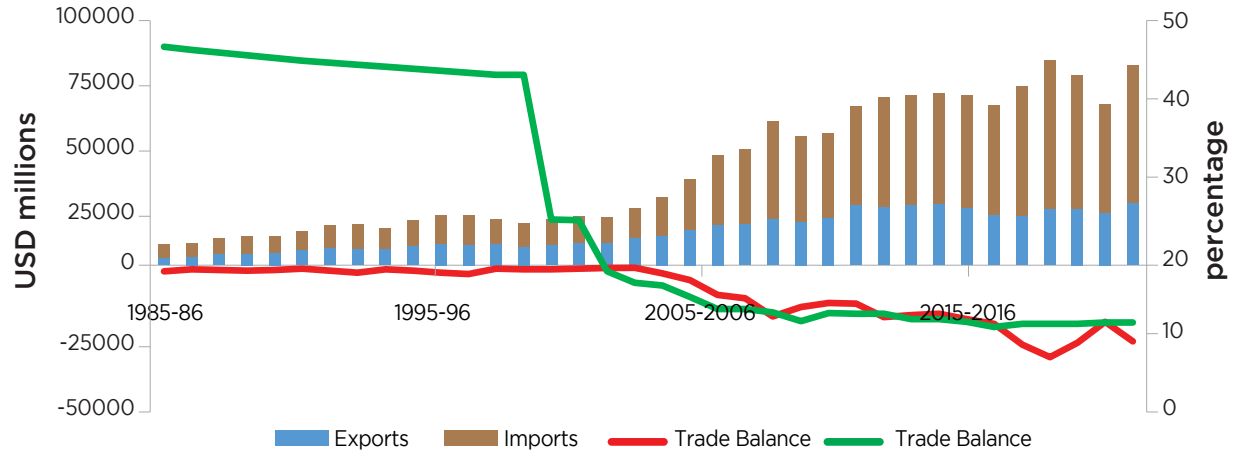


Source: World Bank, WITS database (2020), Misc Sources

1.5. Pakistan Global Trade Scenario (1985-2021)

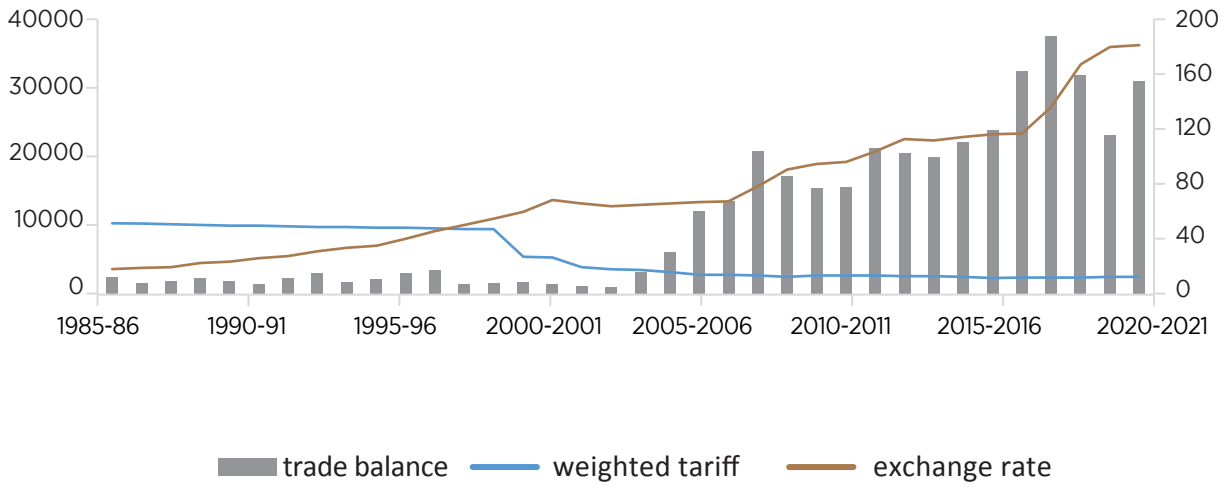
Pakistan's trade volume is increasing ever since 1985 but the negative trade balance is widening continuously since 2005. Policy instruments used for trade liberalization cushioned the increasing trade deficit (see figure: 1.4). In the year 1999, Pakistan's weighted average tariff was 43 percent which declined to 17.5 in 2005. Exchange rate devaluation also increased post-2006 (see figure: 1.5). For better market access and liberalization, Pakistan initiated various trade agreements post 2005. By implementing outward-looking policies such as tariff reduction, and exchange rate devaluation, growth in imports outpaced exports. A low tariff structure was conductive for imported inputs but exchange rate depreciation and market openness fuelled the cost of imported inputs for industries.

Figure 1.4: Pakistan Trade and Tariff Structure (1985-2021)



Source: Pakistan bureau of Statistics (2020), Misc Sources

Figure 1.5: Pakistan Trade Balance, Exchange Rate, Weighted Tariff (1985-2021)



Source: Pakistan Bureau of Statistics (2020), Misc Sources

1.6. Comparative Analysis of Import and Tariff Structure of Pakistan and its Regional Competitors

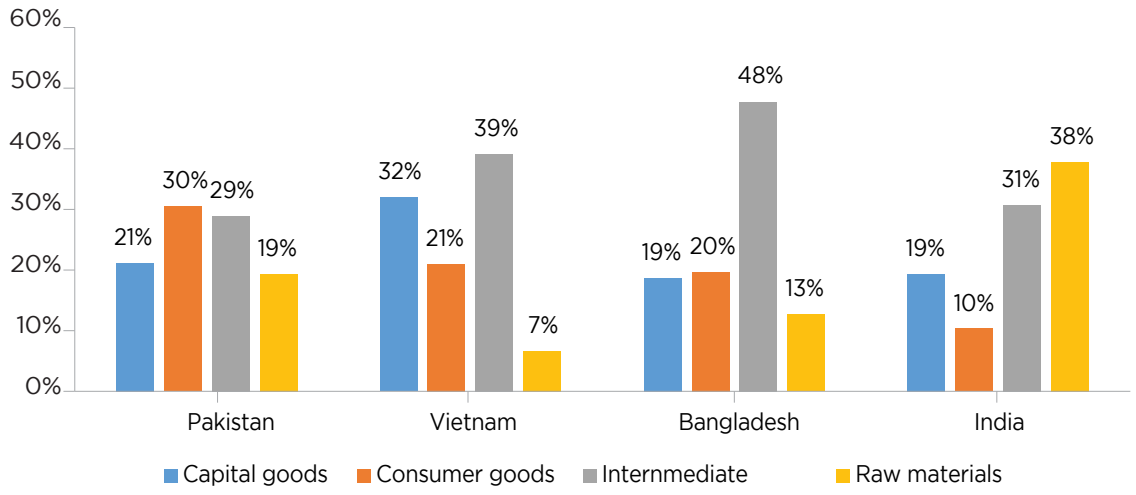
In the past five years, Pakistan's imports are mainly driven by consumer goods (30%) followed by intermediate (29%), capital (21%), and raw materials (19%). Accordingly, the tariff structure is defined as having more tariffs on consumer goods (13.1%) while less on capital, intermediate and raw material. However, this picture remains inconclusive if we overlook the import and tariff structures of other countries. India and Bangladesh in comparison to Pakistan, have less share of consumer goods in total imports. While Bangladesh's tariff on consumer goods is the highest, India has a tariff of 12.4% indicating the incentive for final goods produced in both countries.

For intermediate goods, both India and Bangladesh have a high share in imports than Pakistan however they have imposed high tariffs to develop their backward linkages for a sustainable industrial base.

For capital goods, the import share of Pakistan, India, and Bangladesh are quite similar yet the tariff structure for capital goods in both countries is less restrictive than in Pakistan.

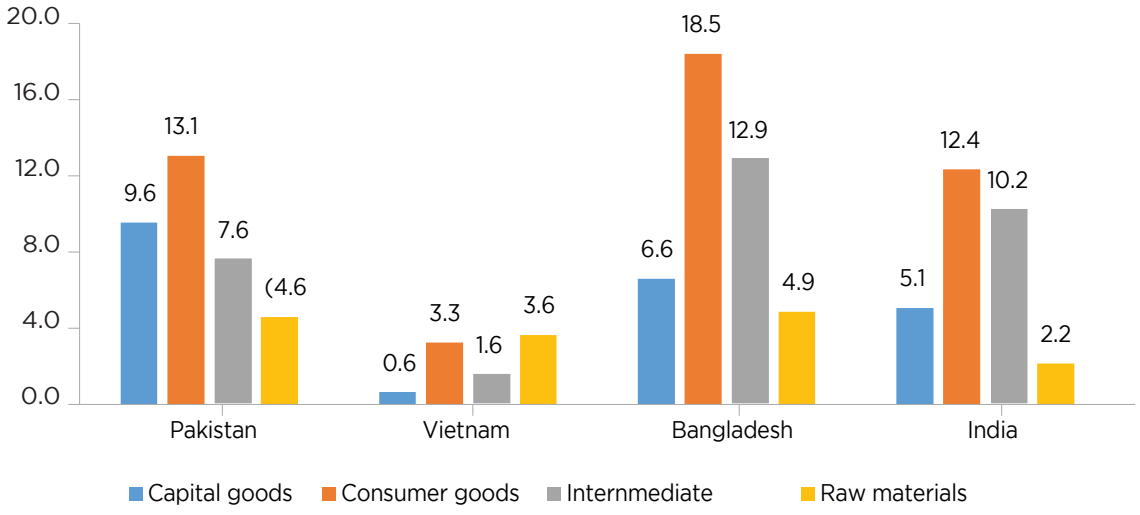
In nutshell, both countries have a high tariff on consumer goods (final goods) but their tariff on intermediate and raw materials is also high, indicating an inward policy to build their manufacturing base (see figure: 1.6 & 1.7).

Figure 1.6: Imports Structure of Regional Competitors



Source: WITS (2020)

Figure 1.7: Tariff Structure of Regional Competitors



Source: WITS (2020)

2. IMPORT SUBSTITUTION OPPORTUNITIES IN PAKISTAN-SELECTION OF KEY SECTORS

Pakistan's major import basket is dominated by petroleum (crude & refined) products that make-up 20 percent of the total imports in Pakistan. Machinery (mechanical & electrical) has a share of 18 percent while agriculture and other chemicals have a share of 16.4 percent. The food and chemical group constitute 14.7 and 8.6 percent respectively (see table: 2.1)

For the current analysis of import substitution, we have selected sectors that constitute a significant share of our imports, and have domestic production but are unable to meet the domestic demand. We have considered petroleum, steel and iron scrap, raw cotton, and oilseeds for exploring import substitution opportunities.

Table 2.1: Pakistan Import Structure and Sector-Wise Share

SECTORS	2018-2019	share %	2019-2020	share %	2020-2021	share %
	Values in USD million					
TOTAL	**55,169.3**		**41,347.3**		**56,580.9**	
Petroleum group	**14,441.5**	**26.2**	**9,396.3**	**22.7**	**11,342.7**	**20.0**
Machinery group	8,947.7	16.2	8,478.8	20.5	10,166	18.0
Agricultural and other chemicals	8,758.7	15.9	6,868.5	16.6	9,292.6	16.4
Food group	**5,665.2**	**10.3**	**4,999.2**	**12.1**	**8,337.6**	**14.7**
Metal group	**4,984.4**	**9.0**	**3,752.6**	**9.1**	**4,890.4**	**8.6**
Textile group	**3,221.1**	**5.8**	**2,227.6**	**5.4**	**3,864.6**	**6.8**
Transport group	3,179.9	5.8	1,436.1	3.5	2,993	5.3
Miscellaneous group	1,025.1	1.9	746.4	1.8	1,216.2	2.1

Source: Pakistan Bureau of Statistics, PBS

The report aims to target major sectors that constitute 32 percent of our total imports in 2020-21. Around 18.3 USD billion are targeted to evaluate import substitution opportunities. The impact of import substitution can bring foreign exchange savings which could lead to stability and growth. By adopting sector-wise import substitution policies savings of USD 2.1 billion in iron and steel, USD 1.1 billion in cotton production, 0.5 billion in oilseeds, 1.9 USD billion in palm oil, USD 3.8 billion, and USD 1.1 billion through oil refineries can be materialized. (See table below)

Table 2.2: Import Substitution Combine Benefits

Products					
Iron and Steel	Cotton	Oilseeds and Palm oil	Refinery	Petrochemicals	Total
Current Imports USD billion (2020-21)					
3.8	1.4	3.1	8	2	18.3 (32%)
Imports saved (USD billion)					
2.1	1.1	2.4 (0.5+1.9)	3.8	1.3	10.5 (18.7%)
Time Span					
1	4	6-7	5-6	1	-

Source: Author's own calculation. Data is taken from PBS

Detail analysis of each sector in terms of its import substitution opportunity has been discussed in the next section of the report. The total impact of import substitution can be combined to generate USD 10.5 billion of foreign exchange savings which make up 18.7 percent of the total imports in 2020-21.

The benefit of import substitution can be further extended by analyzing its impact on the trade balance. We assume if Pakistan increases its exports by 10 percent while imports increased by 3 percent annually coupled with a gradual import substitution of USD 1 billion each year then it can drive the trade balance to reach a surplus in the 12th year.

Table 2.3: Expected Outcomes of Import Substitution and Export Growth

Years	Exports	Imports	Revised import	Trade Balance
Values in USD billion				
FY-20-21	25.3	56.38		
Year 1	27.83	58.07	57.07	-29.24
Year 2	30.61	59.81	58.81	-28.2
Year 3	33.67	61.61	60.61	-26.94
Year 4	37.04	63.46	62.46	-25.42
Year 5	40.75	65.36	64.36	-23.61
Year 6	44.82	67.32	66.32	-21.5
Year 7	49.3	69.34	68.34	-19.04
Year 8	54.23	71.42	70.42	-16.19
Year 9	59.66	73.56	72.56	-12.9
Year 10	65.62	75.77	74.77	-9.15
Year 11	72.18	78.04	77.04	-4.86
Year 12	79.4	80.38	79.38	0.02
Year 13	87.34	82.8	81.8	5.54

Source: Authors' calculations. Data for the analysis was taken from PBS

3. IMPORT SUBSTITUTION CUM EXPORT PROMOTION MODEL FOR PAKISTAN

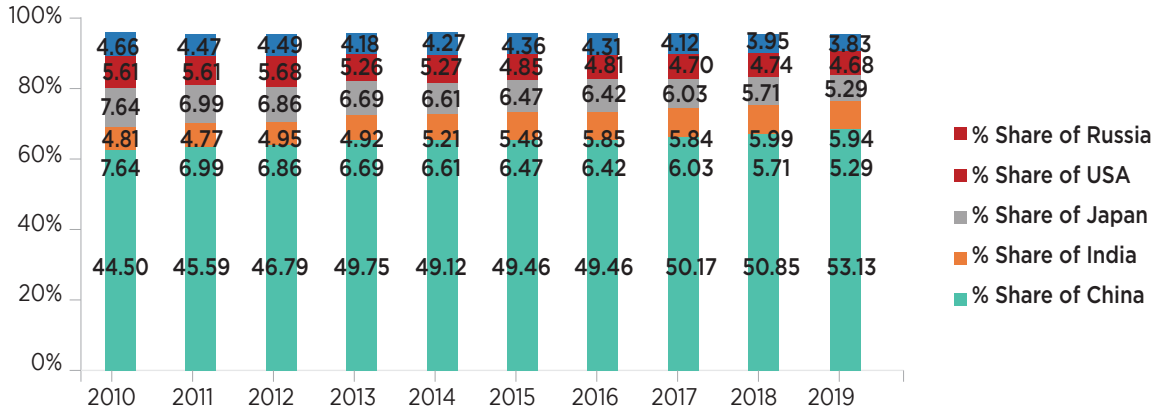
Pakistan needs import substitution cum export promotion strategies to build its manufacturing base. In the first phase, it is suggested to incentivize foreign firms for building their assembling plants with zero duty on raw and intermediate goods imports. In this phase firms investing will realize their full potential of market size with maximum profits. It is important to engage foreign firms in knowledge transfers by linking universities with foreign firms. In the second phase, Pakistan should increase tariffs on raw materials and intermediate goods to develop its own market; should increase competition by inviting more foreign players; must fix the localization rate and rebate taxes with an increasing rate of localization for high technological processes. In the third phase, Pakistan needs to incentivize these firms in form of export subsidies or duty-free raw materials to export final products. A joint collaboration between local and foreign manufacturers for building the Pakistani brand name should be encouraged.

In addition to this, the government needs to rethink its policy of tariff liberalization and exchange rate depreciation for manufacturing firms as in Pakistan most of the industries are dependent on foreign inputs. Even if tariff concessions are granted on inputs its benefits are eroded by currency depreciation as the cost of production remains uncertain while output prices are constant. Further to improve the competitiveness of industries, it is important to strengthen backward linkages between sectors that ultimately reduces the dependence of industries on foreign input. FDI and gross capital formation need a more policy conducive environment that builds more sustainable industrial sector growth and productivity in Pakistan.

4. GLOBAL STEEL OUTLOOK

World steel production has increased significantly from 1,435 million tons in 2010 to 1,875 million tons in 2019. Major steel-producing countries of the world include China, India, Japan, the United States, Russia, South Korea, Germany, Turkey, Brazil, and Iran. Their respective share is depicted in figure 4.1. Pakistan produces 0.18 percent of the world's production and stands at 39th position out of 50 countries.

Figure 4.1: Share in World Crude Steel Production



Source: World Steel Association

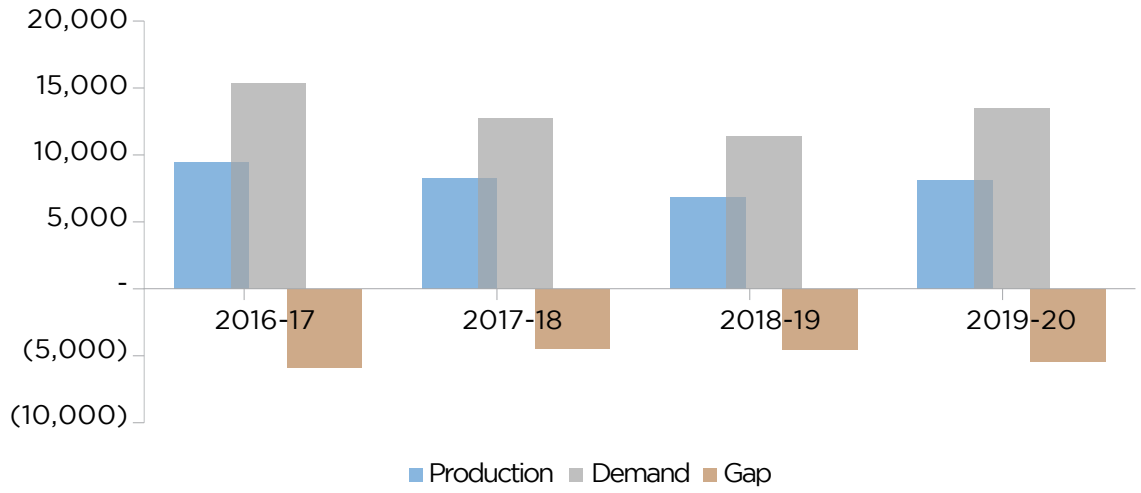
4.1 Pakistan Steel Industry Outlook

Pakistan steel local production is unable to meet the increasing domestic demand. Local production in 2016-17 was 7.7 million tons (MT) and demand was 12 MT with a gap of 4.2 million tons. Over the last 5 years, the gap between production and demand is widening. In 2016-17, there was a deficit of 36 percent of the demand which increased to 40 percent in 2019-20. Production grew by a CAGR of 1 percent in the last 5 years whereas demand also surged by a CAGR of 2 percent. In order to reduce the gap, production has to grow by double the rate of demand. In 2020-21, total production was 8 (MT) whereas demand was 13.4 (MT) on annual basis. From 2016-17 to 2018-19, demand and production grew by a CAGR of 2 percent respectively. Whereas from 2018-19 to 2020-21 demand grew by a CAGR of 2 percent, but production declined by 1 percent[5].

Year on Year (YoY) production growth in 2017-18 was 22 percent as compared to demand growth of 28 percent, whereas production declined to 13 percent in 2018-19 and demand declined to 17 percent in the same year. In the year 2020-21, production grew by 18 percent year on year as compared to demand which grew by 19 percent respectively.

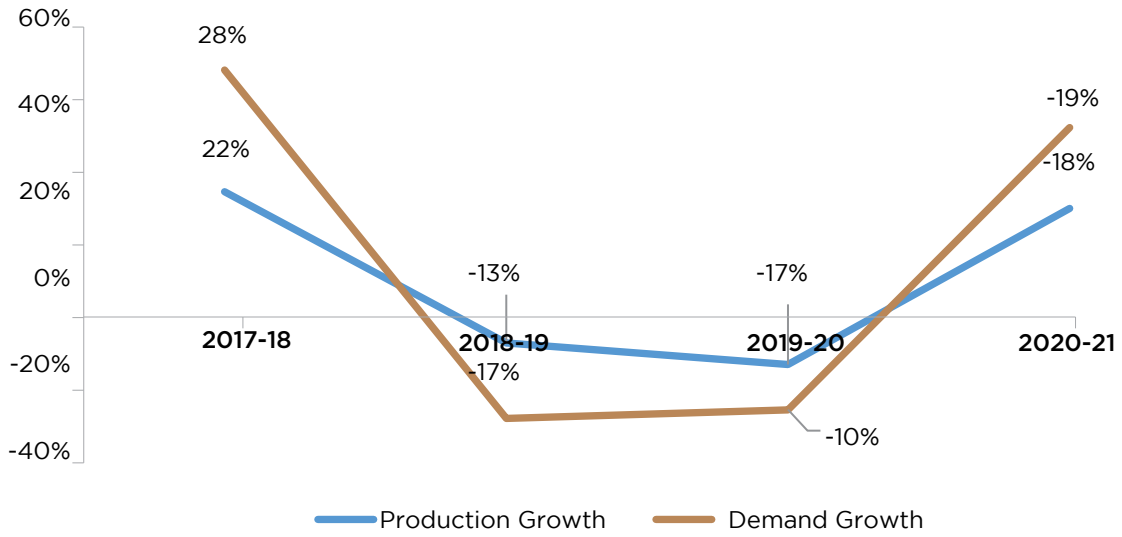
[5]The database is taken from Quantum index of large scale manufacturing (QIM) from PBS

Figure 4.2: Pakistan Steel Production and Demand - (MTons)



Source: PBS

Figure 4.3: Production and Demand Growth Trend (Tons)



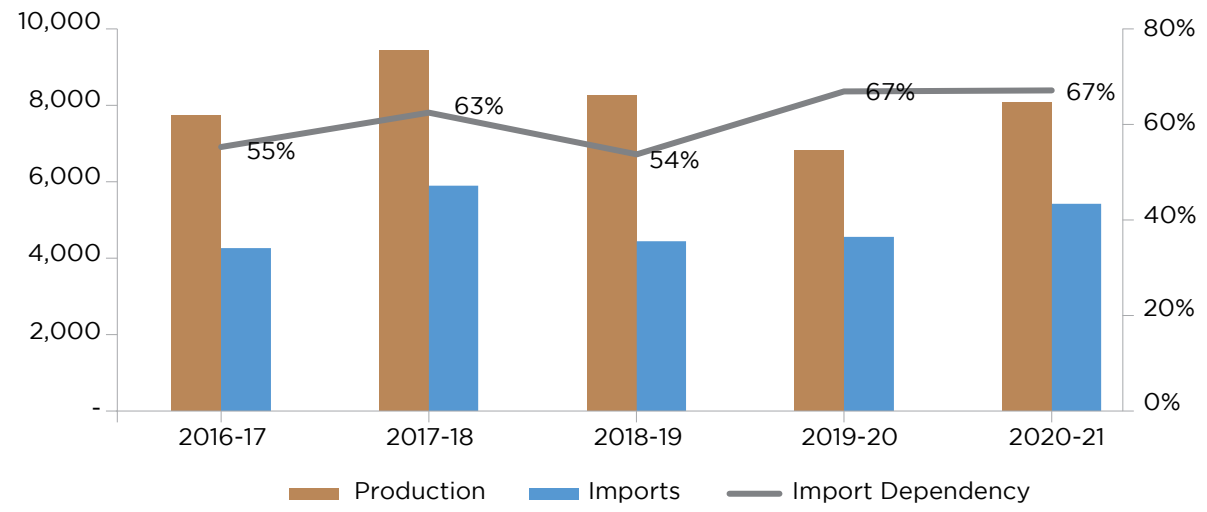
Source: PBS

4.2 Case of Import Substitution

4.2.1. Import Dependency

Steel industry dependency on imports continues to rise. In 2016-17, 55 percent of the steel was imported which mainly consists of steel scraps, billets, and coils. Total production during the year was around 7.7 (MT) whereas imports were 4.2 (MT). The same trend continues in the next several years as dependency hovers around 63 percent in 2017-18 as production was 9 (MT) and imports were 6 (MT). However, in 2020-21 import dependency increased to 67 percent as production was 8 (MT) and imports were 5.5 (MT) (see figure: 4.4).

Figure 4.4: Steel Industry Import Dependency (M. Tons)

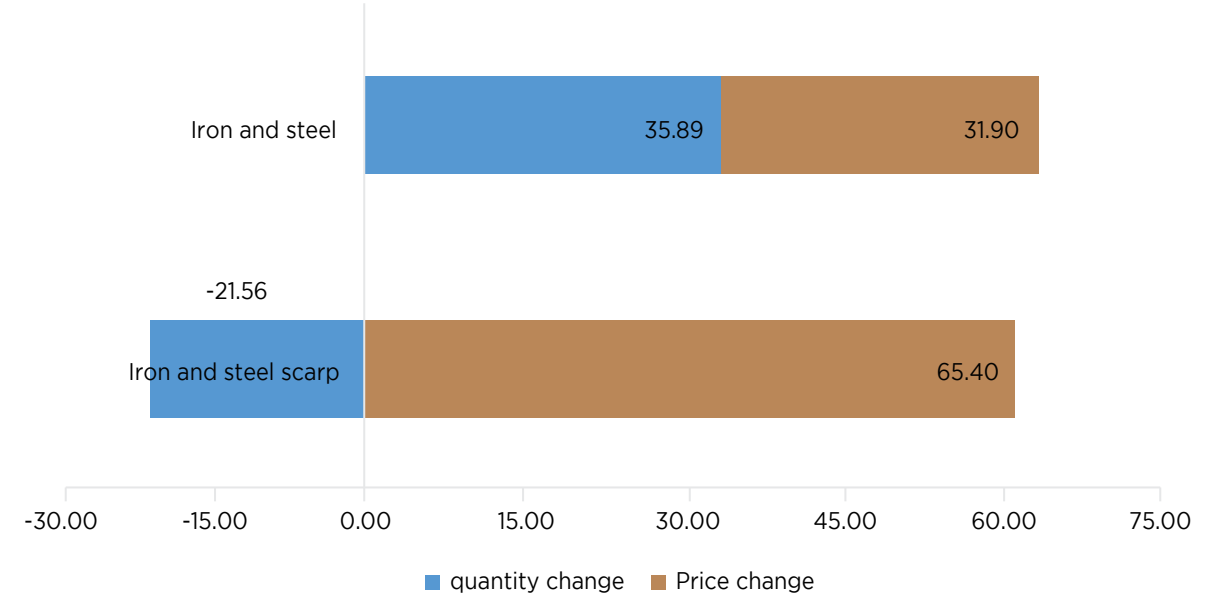


Source: PBS

4.2.2. Price and Quantity Variation

Steel imports have been analyzed to capture the price impact and the quantity impact on its import value from July-Dec 2021 against July-Dec 2020. Data suggests that there is a price impact on iron and scrap imports against the same period last year which proves that increase in value imports is due to an increase in price. On the other hand, import of iron and steel have both price and quantity effects which shows that both price and quantity impacted an increase in imports.

Figure 4.5: Price and Quantity Change (percentage) (July-Dec 2021) VS (July-Dec 2020)

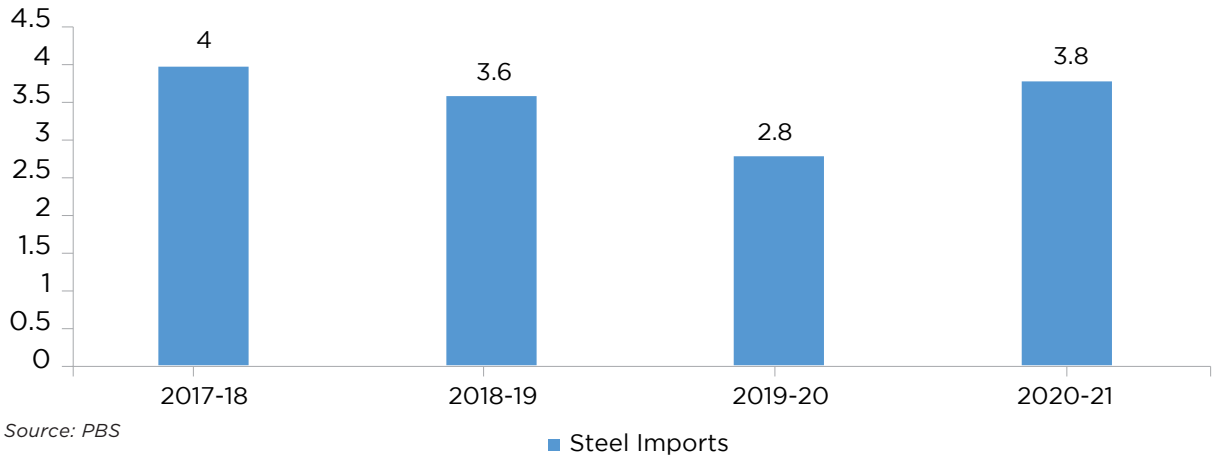


Source: PBS

4.2.3. Pakistan Steel Imports

It is imminent that a gap between local production and demand has to be filled through imports. Steel imports remain to be on the higher side as it continues to enjoy the potential to tap the un-full filled demand. Steel imports in 2017-18 were around USD 3.8 billion of our total imports having a share of 7 percent. Average imports for the last 4 years were around USD 3.6 billion and have maintained their share of 7 percent in total imports. These imports are a major concern as they continue to drive the widening of the trade gap.

Figure 4.6: Pakistan Steel Imports (USD billion)

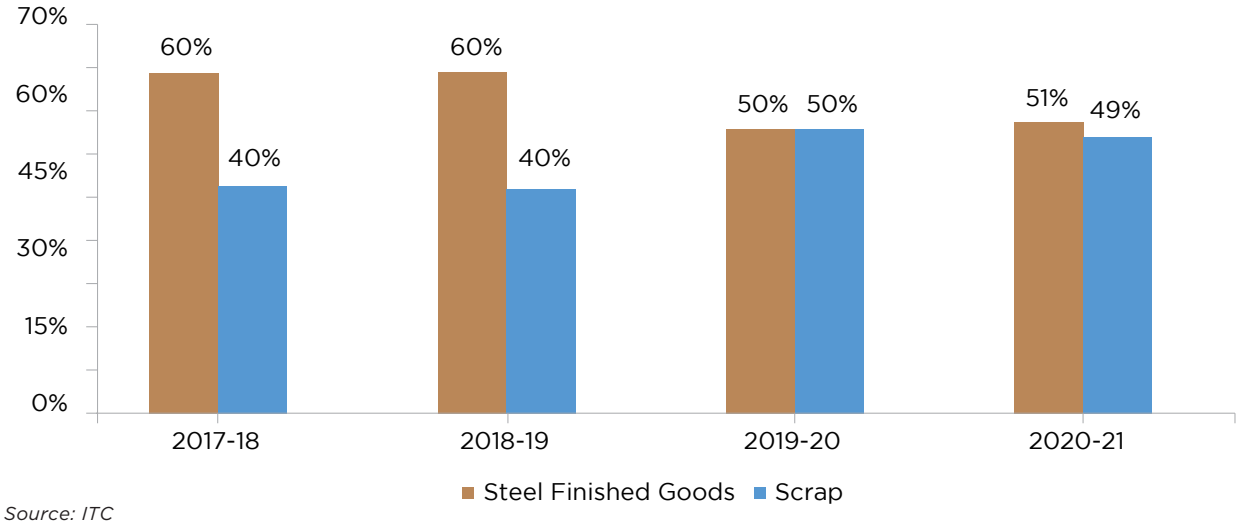


Source: PBS

4.2.4. Steel Imports Mix

Steel imports composition can be further analyzed by bifurcating steel imports into finished products and scrap products. The share of finished products in steel imports was 60 percent in 2017-18 which decline to 51 percent in 2020-21. Whereas, the share of steel scraps was 40 percent in 2017-18 increased to 49 percent in 2020-21.

Figure 4.7: Pakistan Steel Imports Share in Total Steel Imports (Value in Percentage)



Source: ITC

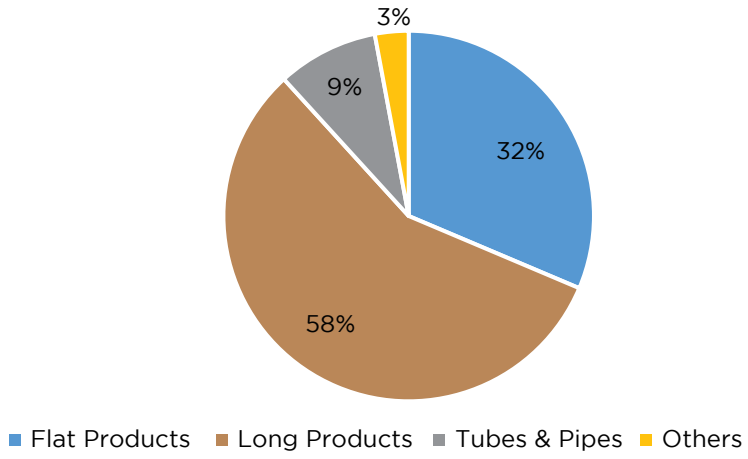
Keeping in view Pakistan's import dependency ratio, steel import share, and steel product mix we have considered the import of Scrap to be replaced by domestic mining of iron ore.

5. STATE OF THE STEEL INDUSTRY

5.1. Major Steel Products and Their Shares

The steel industry is divided into three major products. Flat products include coils and sheets, long products which consist of billets/rebar and beams and tubes and pipes. Long products contribute 58 percent of the production, Flat products 32 percent of the production, tubes, and pipes 9 percent, and other products contribute 3 percent of the total production. Long products are further divided into graded and un-graded products. The majority of the un-graded products are obtained through the shipbreaking industry having low quality and high environmental impact.

Figure 5.1: Product Wise Share (percentage)

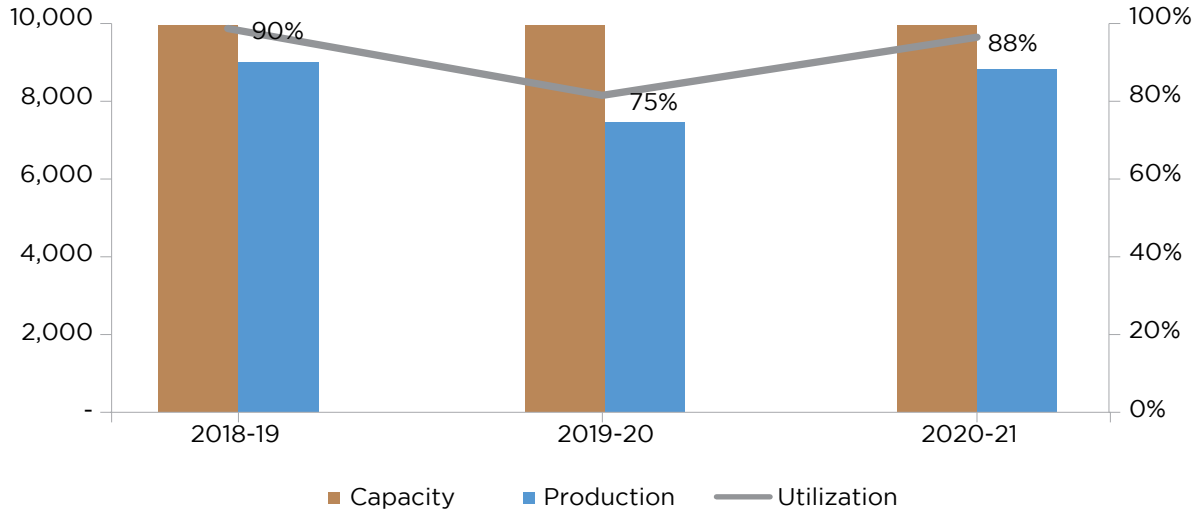


Source: Pakistan Bureau of Statistics (2020), Misc Sources

5.2. Industry Capacity and Utilization Rate

The steel industry has a capacity of around 9 MT according to National Steel Advisory Council (NSAC) 2018-19. Steel production in the year 2018-19 was around 8.2 MT hence the utilization rate was 90 percent. However, this rate declined to 88 percent in 2020-2021.

Figure 5.2: Industry Capacity and Utilization Rate (M.Tons)



Source: NSAC/PBS

5.3. Major Players with Total Capacity

Table 5.1: Major Players in Steel Industry with their Total Capacity

Category	Product Line	Company	Company Capacity (MT)	Total Domestic Capacity (MT)
Long Products	Billets Rebar, Wire-Rod, Angles, Shapes, Structural Sections, Beams, Girders	Amreli Steels Ltd.	700,000	5,000,000
		Mughal Steel Ltd.	700,000	
		Agha Steel	400,000	
		Abbas Steel Group	300,000	
		Others	2,350,000	
Flat Products	Hot Rolled Coil	Pakistan Steel Mills *	550,000	
	Cold Rolled Coil,	Pakistan Steel Mill*	550,000	550,000
	Galvanized Coil,	Aisha Steel Mill Ltd.	750,000	1,750,000
		International Steels Ltd	1,000,000	
Tubes & Pipes	Color Coated Coils Spiral Welded Pipes, Polymer Coated Pipes	250,000 Crescent Steel & Allied Products Ltd.	450,000 [3]	
		Others	200,000	
	Longitudinally Welded Tubes & Pipes, Galvanizing	International Industries Ltd	750,000	1,150,000
		Others	400,000	
	Seamless Pipes	Huffaz Seamless Pipe Ltd	100,000	150,000
Alloy & Engineering Steels	Bars, plates, forgings, etc	Peoples Steel Mills **	50,000	
		Peoples Steel Mill**	75,000	75,000

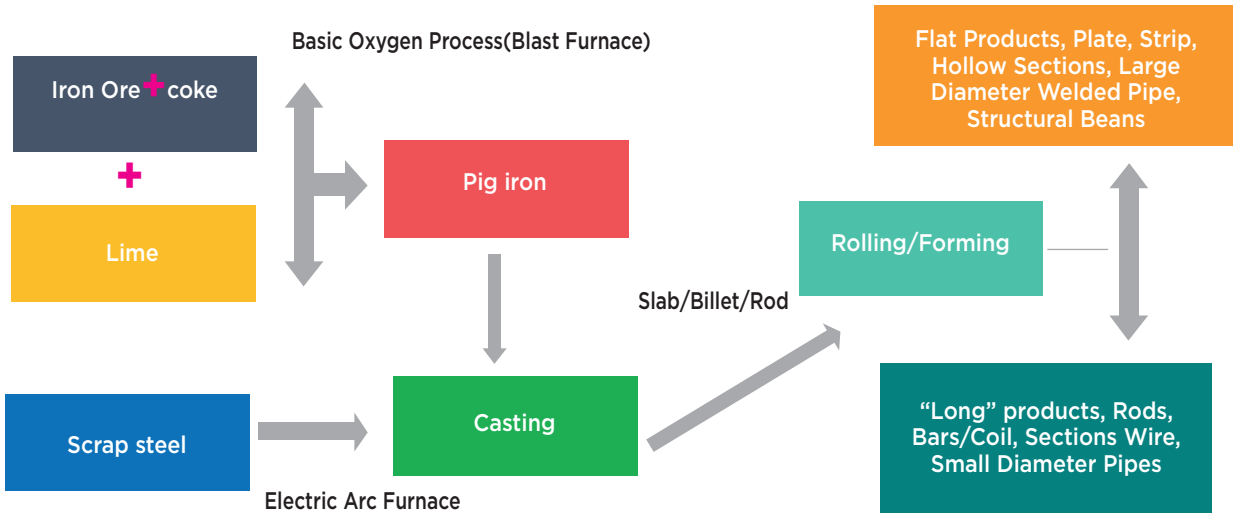
***Pakistan Steel Mills (PSM) has been out of commission since June 2015**
****Peoples Steel Mills' seamless pipe plant will be operational in March 2019**

Source: National Steel Advisory Council

5.4. Industry Value Chain

The following figure indicates the process through which steel and its related products are being manufactured.

Figure 5.3: Steel Value Chain



6. SCRAP, IRON ORE, AND METALLURGICAL COAL

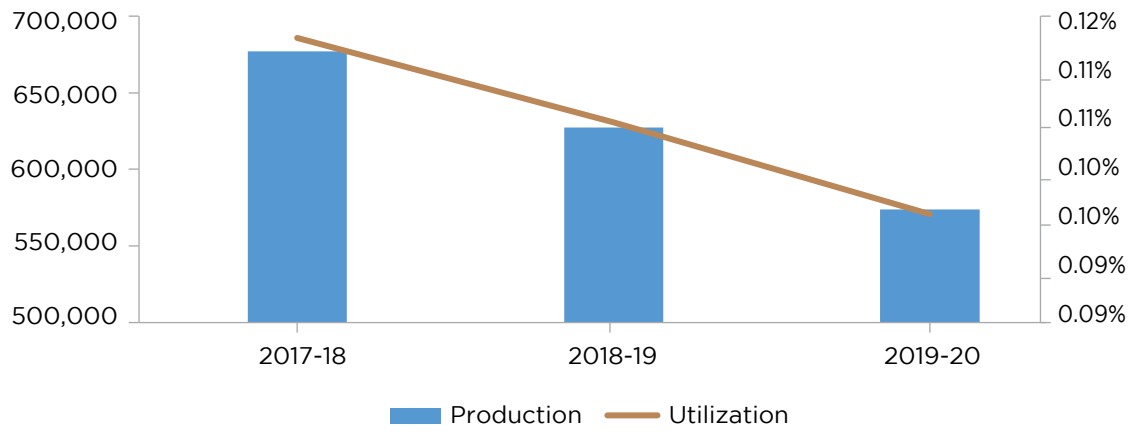
It is estimated that today global steel industry utilizes about 2 billion tons of iron ore, 1 billion tons of coal, and 575 million tons of scrap steel to produce 1.7 billion tons of crude steel.[6] The global production mix indicates that 70 percent of the steel production is done by using iron ore as a raw material with blast furnace technology while 30 percent of the production processes use Scrap with electric arc furnace[7]. Recycled steel which is also called scrap is one of the raw materials used in the steel industry. Scrap is mostly produced from the demolished car structures and machinery and yields losses in the steelmaking. Scrap is used in the electric arc furnace and some in the blast furnace.

Iron ore and coal are used mainly in the blast furnace to make iron and steel. The process converts coking coal into coke which is used as a fuel in a blast furnace. The conversion factor from iron ore and coke to pig iron is around 1.5 tons of ore and 450 kg of coke for 1 ton of pig iron[8]. Gas can be replaced by coal in the blast furnace.

6.1. State of Iron Ore Reserves

According to the Pakistan Bureau of Statistics (PBS), total iron ore reserves in the country is around 1 billion tons while annual production is around 0.6 million tons. The utilization comes out to be around 0.10 percent. Production has further declined in the last 3 years as it went down from 0.68 million tons in 2017-18 to 0.57 million tons in 2019-20 which is a decline of around 18 percent year on year. In Pakistan iron ore reserves are found in; Kalabagh, Haripur Nokundi, Chinot, while some of the potential sites are Kharan/Chaghi (Balochistan) and North Waziristan (FATA)[9]

Figure 6.1: Iron Ore Production (Tons)



Source: PBS

[6]World steel association
[7]National steel policy,2019
[8]Database from world steel association
[9]Strategy for minerals sector development in Pakistan.

6.2. Iron Ore Utilization

Pakistan's iron ore reserves are estimated to be around 1 billion tons as per the PBS. 1.5 million tons of iron ore can be used to produce 1 million tons of iron as per the World Steel Association. According to this conversion rate, 8 million tons of iron production would utilize 12 million tons of iron ore at a utilization rate of 2 percent. Iron ores reserves can fulfill the needs of current production for the next 50 years. However, the current demand for steel industry is around 13.5 million tons. Iron ore usage at current demand would be 20 million tons at a utilization rate of 3 percent. At this rate, iron ore reserves can full fill the needs for 30 years.

6.3. Cost Analysis

In the year 2020-21 imports of steel scrap stood at USD 1.9 billion in value and 4.7 million tons in volume. The per-ton value is estimated to be around USD 403 and PKR 68,510[10].

However, the iron ore price in the local market is around USD 120 per ton and PKR 21,240.[11] The local iron ore is cheaper than the imported scrap in USD terms by 70 percent and in PKR terms by 60 percent. This reflects the cheap availability of raw iron ore in the country which could be utilized as a raw material in the steel industry against the expensive steel scrap. This would reduce the import burden and may create breathing space for the economy.

Table 6.1: Price Comparison of Steel Scrap and Local Iron Ore Export

Cost Variance	Scrap (Imports 2020-21)		Local Iron Ore (Export Price FOB)		Variance	
	US$	PKR	US$	PKR	US$	PKR
Cost Per Ton	403	68,510	120	21,240	-70%	-69%

Source: PBS/Trade Key

6.4. Current Duty Structure

The current duty structure for the scrap and shipbreaking sector is 0% with 5% regulatory duty on scrap only. Zero duty regime on scrap and shipbreaking is leading to a wave of higher imports and causing an imbalance in the economy. Despite abundant availability of raw iron ore in the country higher scrap imports increase the burden on the economy.

Table 6.2 : Duty & Tax Structure for Steel Scrap

	Custom Duty	RD	ST	WHT
Scrap	0%	5%	17%	1%
Shipbreaking	0%	0%	17%	2%

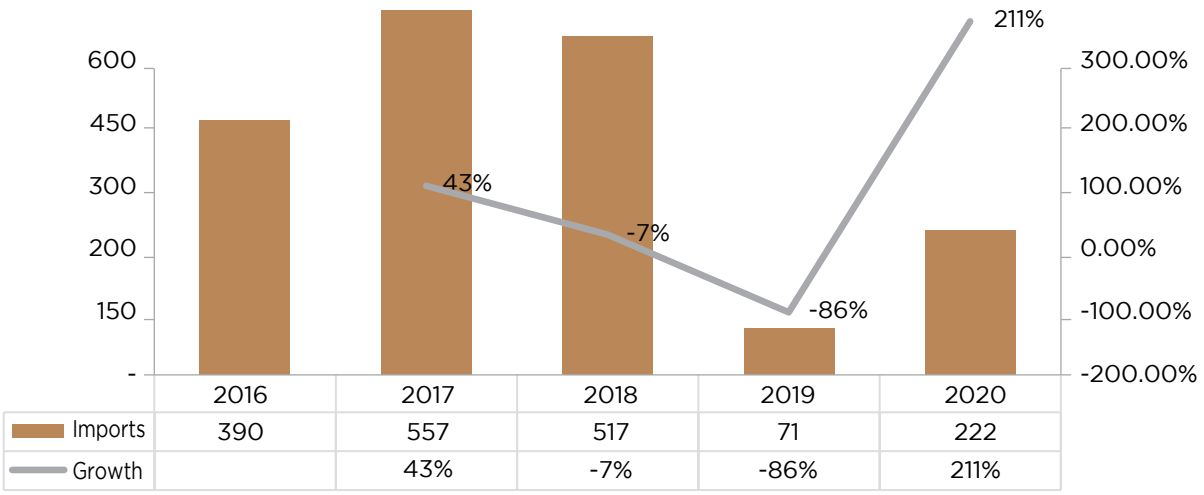
Source: FBR

[10]Trade map, ITC
[11]Trade key, export price per ton.

6.5. Shipbreaking Overview

Shipbreaking has been one of the sources of raw material to be used in iron and steel making. Shipbreaking has seen substantial growth in 2017 against 2016. It grew by 43%, however, in next two years, a decline was observed. 2019 was a year of decline due to the country's balance of payment crisis and high cost of borrowing. It improved its position in 2020 but still, the level of 2017 is yet to be achieved.

Figure 6.2: Ship Breaking Imports- USD million



	2016	2017	2018	2019	2020
Imports	390	557	517	71	222
Growth		43%	-7%	-86%	211%

Source: Trade Map

Raw material obtained from the shipbreaking industry has a lower cost as compared to imported scrap but is higher than the local iron ores. However, low cost of raw materials is beneficial for the steel industry but it is still based on imports. In the long run, higher demand may again push up the import bill which would lead to a similar crisis.

Table 6.3: Shipbreaking Raw Material Cost Comparison

	Year	Qty Tons	Value $	Cost Per Ton $	Cost Per Ton PKR
Scrap(Imports)	2020	4,534,918	1,665,793,000	367.33	58,001
Shipbreaking(imports)	2020	1,261,797	221,529,000	175.57	27,722

Source: Trade Map

6.6. Steelmaking Technology

There are three major ways through which steel is processed and manufactured. Electric induction furnace, oxygen blast furnace, and electric arc furnace.

6.6.1. Electric Induction Furnace

An electric induction furnace uses a power supply through a capacitor and induction coil to generate high-density magnetic force in the induction coil which cut the material in the induction coil. Induction furnaces have high melting efficiency, power-saving effect, compact structure, and strong overload. Temperature around the furnace is low, dust is low and the work environment is good. Utilization rate in induction furnaces is high and metal composition is uniform. This type of furnace is useful for small light to weigh workshops.

6.6.2. Electric Arc Furnace

Electric arc furnace is an electric furnace for smelting ores and metals with high temperature generated by electrode arc. When the arc is formed by gas discharge, the energy is concentrated and the temperature of the arc zone is above 3000 ˚C. For smelting metals, EAF is more flexible than other steelmaking furnaces, which can effectively remove sulfur, phosphorus, and other impurities. The furnace temperature is easy to control, and the equipment covers a small area. It is suitable for smelting high-quality alloy steel.

The electric arc furnace uses the power frequency electricity, while the electric induction furnace uses the medium frequency electricity.

6.6.3. Blast Furnace

A blast furnace is a process of producing raw iron by using oxygen or coal. The end products are molten metal, slag, and furnace gas. Blast furnace technology is suitable for large-scale continuous production. It has a low power requirement with high efficiency. Product quality is much better as compared to EAF and EIF with low production costs due to economies of scale.

6.6.4. Cost Comparison between Types of Furnace

Table-6.4 provides a cost comparison of blast furnace and electric arc furnace. Blast furnace based on coal and natural gas has a capital cost of 200 euro per MT per year and 145.23 euro per MT per year. EAF, on the other hand, has a capital cost of euro 80.96 per MT per year but with a variable cost of $ 31.78 per MT per year which does not includes material costs. EAF technology is cost-competitive but for limited production, however blast furnaces can produce a large amount of steel which could reduce the fixed cost in the long run and bring economies of scale.

Table 6.4: Cost and Material Comparison Furnaces

Costs and Materials	Coal	Natural Gas	EAF
Capital Cost mt/year	€200	€145.23	$80.96
Variable O&M mt/year	€2	€12.93	$31.78
Fixed O&M mt/year	€10		
Input Coal(pJ)	27		
Input NG (ton in/ton out)		0.24	
Input electrical power	0.324pj	135.4Kwh/ton	697.7Kwh/ton
Input oxygen gas(mt)	0.69		
Input oxygen gas(Nm3/ton out)			10.43
Co2 emission(mt/mt metal)	2.9	0.65	0.058

Source: International Energy Agency, IEA; Energy Technology System Analysis Performance, ETSAP 2010

6.6.5. Major Players' Technology and Capacity

Scrap as a raw material has been used by players who have installed electric arc furnaces or electric induction furnaces whereas iron ore has been used by players with blast furnaces run on natural gas or coal. Blast furnaces are used by large players as they can produce quality products with more output. Electric arc furnaces have now become more common for middle capacity firms with low capital cost and quality products, however, scrap is mostly used as a raw material due to the high amount of power required for melting raw iron ores.

Table 6.5: Long Products Technology and Output

Company	BF	EAF	EIF	Raw material	Capacity in tons
Amreli Steels Ltd.		✓		Scrap	700,000
Mughal Steel Ltd.			✓	Scrap	700,000
Agha Steel		✓		Scrap	400,000
Abbas Steel Group			✓	Scrap/Iron ore	300,000
Pakistan Steel Mill	✓			Iron Ore	1,000,000
Tuwairqi Steel	✓			Iron Ore	1,300,000
Pak China Steel	✓			Iron Ore	100,000
Source: NSAC/Company websites					
BF-Blast Furnace					
EAF-Electric Arc Furnace					
EIF-Electric Induction Furnace					

Source: NSAC/Company websites

7. EXPECTED SAVINGS

Scenario 1: Scrap to Iron Ore
Assumption

If Pakistan completely utilizes iron ore for domestic production

Results

Currently, Pakistan has iron ore reserves of more than USD 600 million. With the increased exploration and production of iron ore, precious foreign exchange can be saved. As per the current production of 8 million tons, imports of steel scrap are around 5.4 million tons. Keeping in view our current domestic production of 8 million MT, if the steel industry utilizes iron ore it can reduce the import bill of USD 1.9 billion in the first year (see table below). The substitution of iron ore against steel scrap can save imports as it is more cost-effective and abundantly available. USD 1.9 billion savings are based on the actual imports of steel scrap in 2020-21

Table 7.1 : Expected Benefit Iron Ore Substitution

Projected Years	Production (000 MT) (1)	Demand (000 MT) (2)	Imports (1)-(2) (000 MT) (3)	Iron Ore Usage (000 MT) (4)= (1)* (1.5)	Utilization (5)= (7)/(4)	Surplus (6)= (1)-(2) MT	Current reserves millions (7)	Life (8)=(7)/ (4)	Price (9)= (10)/(3)	savings (10)= (3)*(9
base year	8073	13493	5420	0	0	(5,420)	600	0	351	(1.9)
Year 1	8073	13493	5420	12109	2%	(5,420)	600	50	351	1.9

Source: Authors' calculations. Data for the analysis was taken from PBS

Scenario 2: Expected Benefit of Finished Products

We consider the following assumptions;

Production	first-year increases by 20%, second-year increases by 15%, third-year increases by 13%, fourth-year increases by 11%
Demand	Increase by 5%
Reserves	Increase by 5%

Results

Given the past five-year average production of 8 million MT and keeping in view the above assumptions, Pakistan can meet its entire demand for steel finished products by utilizing iron ore. In doing so Pakistan will utilize only 2 percent of its reserves by producing 20 million MT of steel products. Pakistan will also save USD 1.9 billion of reserves with additional export surplus of USD 0.5 million.

Table 7.2 : Expected Benefit Steel Production with Iron Ore Use

Projected Years	Production (000 MT) (1)	Demand (000 MT) (2)	Imports (1)-(2) (000 MT) (3)	Iron Ore Usage (000 MT) (4)= (1)* (1.5)	Utilization (5)= (7)/(4)	Surplus (6)= (1)-(2) MT	Current reserves millions (7)	Life (8)=(7)/ (4)	Price (9)= (10)/(3)	savings (10)= (3)*(9
Year 0	8073	13493	5420	12109	2%	(5,420.0)	600	50	351	(1.9)
Year 1	9688	14168	4480	14531	2%	(4,480.1)	630	43	386	(1.7)
Year 3	12589	15620	3031	18884	3%	(3,030.8)	694	37	467	(1.4)
Year 5	15371	17221	1850	23057	3%	(1,849.7)	765	33	565	(1.0)
Year 7	18599	18986	387	27899	3%	(386.8)	844	30	683	(0.2)
Year 9	20459	19935	(524)	30689	3%	523.8	886	29	751	0.4

Source: Authors' calculations. Data for the analysis was taken from PBS

To substitute 4,7 million tons of steel scrap from iron ore, investment of around USD 700 million will be required to produce Pig Iron by installing blast furnace technology. The investment amount is based on the estimation derived from the fresh investment done by China in the Steel Industry which is producing Pig Iron

8. PAKISTAN STEEL MILLS REVIVAL AND IMPORT SUBSTITUTION

Pakistan steel is strategically located 40km southeast of Karachi in close vicinity to port Muhammed Bin Qasim. Spread over an area of 18,600 acres (29 square miles) with 10,390 acres for the main plant, 8070 acres for the township, and 200 acres for the water reservoir Pakistan steel is Pakistan's largest industrial complex, comprising component units numbering more than 20. Current production capacity of the Pakistan steel mill is around 1.1 million tons which can be extendable to 3 million tons per annum. Its facility includes 2 blast furnaces for the production of pig iron, 2 sinter machines, 2 reheating furnaces for hot-rolled coils (HRC), four high reversible machines, and 1 bell type annealing furnace for C.R coils/galvanized sheets and H.R sheets. Pakistan steels capacity for long and flat products is around 550,000 tons for each product per annum. The capacity can be enhanced to 3 million tons in total with a 1.5million tons enhancement for each long and flat product[12].

Flat products consist of hot rolled coils and C.R Coils which are mostly used in the automobile and appliances sector. H.R coils and C.R coils are mostly imported in Pakistan. In the last 5 years, 2.8 million tons of H.R and C.R coils are imported having an imported value of USD 1.8 billion. Pakistan steel mills have been manufacturing H.R and C.R coil for a long time but due to their closure import dependency has increased. Current production capacity of Pakistan steel mills in flat products is 550,000 tons which if get operationalized can reduce import dependency on H.R coils and C.R coils with the yearly savings in imports of USD 250 million. However, as per PSMC Stakeholders Group with a new investment of USD 300million, the capacity could be enhanced to more than 1 million tons. Increased capacity to 1 million tons with 90 percent utilization rate can reduce import dependency and save USD 600 million annually.

Table 8.1 : Expected Benefit Pakistan Steel Revival

				In Tons		Last 5 Yrs Avg		USD	Revised Imports		
Current capacity (1)	Current Utilization (2)	Enhanced capacity (3)	Enhanced capacity (4)	Utilization % (5)	Production (6)=(3) *(5)	H.R/C.R Coil Imports Tons (7)	Value $ million (8)	Per ton cost (9)	Tons (10)=(7) -(6)	Value $ million	Savings $ million
550,000	0%	550,000	0%	70%	385,000	2,807,862	1,811	644.97	2,422,862	1,563	248
550,000	0%	825,000	50%	80%	660,000	2,807,862	1,811	644.97	2,147,862	1,385	426
550,000	0%	1,100,000	100%	90%	990,000	2,807,862	1,811	644.97	1,817,862	1,172	639

Source: Trade Map/NSAC/Pak Steel

[12]Pakistan steel mills; NSAC

9. IMPORT SUBSTITUTION STRATEGIES (SHORT TERM, MEDIUM TERM, LONG TERM)

Considering the above analysis we have outlined measures to be adopted for import substitution of steel scrap, hot and cold rolled coils. Steel scrap can be replaced by iron ore mining while hot and cold rolled coils can be manufactured by the revival of Pakistan steel mills with enhanced and upgraded capacity. Following strategies need to be considered for import substitution.

Short-term	Medium-term	Long-term
Government should incentivize steel industry to use Iron Ore as a raw material through tax rebates	Long term export and import policy should be developed specifically for the mining sector	Setting up steel industries at the mining sites
Joint collaboration between miners for mechanized mining.	Consider merging Pakistan steel mills with Tuwairqi steel	Large-scale miners should be incentivized to achieve economies of scale.
Revive Pakistan steel mills with upgraded and enhanced capacity	Incentivize backward linkages of steel industry	Public and private partnerships should be encouraged in large-scale mining.
Resolve issues of Tuwairqi Steel	Fix the rate of local iron usage in steel mills	
Joint collaboration in private sector steel industry for blast furnace installation	Develop a national mining policy in collaboration with the provinces	
Gas should be replaced with local coal to flame the blast furnace	Mining policy should encourage private investments along with equal distribution of royalties that should be spent in the local area	
	The policy should harmonize taxes, levies & royalty with world benchmarks to help private sector	

10. CONCLUSION

Higher imports of steel scrap have become a major concern as they continue to drive the widening of the trade gap. Iron ore reserves in the country are around 1,000 million tons with an annual production of 0.6 million tons with utilization of 0.10 percent. Production of iron ore is decreasing for the last 3 years with a decline of 18 percent year on year. In the year 2020-21, imports of steel scrap stood at USD 1.9billion in value and 4.7million tons in volume. Substituting imported steel scrap from local iron ore can save USD 1.9 billion on annual basis. To substitute 4,7 million tons of steel scrap from iron ore, investment of around USD 700 million will be required to produce Pig Iron by installing blast furnace technology. The investment amount is based on the estimation derived from the fresh investment done by China in the Steel Industry which is producing Pig Iron for the industry. ***The local iron ore is cheaper than the imported scrap in USD terms by 70 percent and in PKR terms by 60 percent***. This reflects the cheap availability of raw iron ore in the country which could be utilized as a raw material in the steel industry against the expensive steel scrap.

Pakistan steel had manufacturing H.R and C.R Coil for long time but its closure increased import dependency for the steel sector. The installed production capacity of Pakistan steel mills in flat products is 550,000 tons which if operationalized can reduce import dependency on H.R coils and C.R coils with annual savings in imports of USD 250 million However, as per PSMC Stakeholders Group with a new investment of USD 300million, the capacity could be enhanced to more than 1 million tons. Increased capacity to 1 million tons with a 90 percent utilization rate can save USD 600 million annually.

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