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**Trade Analysis of Pakistan's Chemical Sector**  
**A Case of Exploring Opportunities in Polyester Staple Fiber**  
**Industry**

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## Contents

Disclaimer .....	i
Executive Summary .....	v
<b>Chapter 1 Introduction .....</b>	<b>1</b>
<b>Background of the study .....</b>	<b>3</b>
<b>Problem Statement.....</b>	<b>4</b>
<b>Objective of the Study .....</b>	<b>5</b>
<b>Significance of the study .....</b>	<b>5</b>
<b>Chapter 2 Analysis of the study:.....</b>	<b>6</b>
<b>Polyester Staple Fiber .....</b>	<b>6</b>
<b>Ethylene glycol .....</b>	<b>9</b>
<b>Terephthalic acid and its salts.....</b>	<b>11</b>
<b>Para-xylene .....</b>	<b>14</b>
<b>Chapter 3 Conclusion .....</b>	<b>17</b>
<b>Chapter 4 Recommendations .....</b>	<b>18</b>
<b>Reference; .....</b>	<b>20</b>

### List of Figures

Figure 1 How PTA is obtained from Crude Oil.....	1
Figure 2 Manufacturing Process of Polyester staple fiber .....	2
Figure 4 Global PSF production .....	6
Figure 5 Global Ethylene Glycol Production.....	9
Figure 6 Global production of Purified Terephthalic Acids .....	11
Figure 7 Global production of Para-xylene.....	15

### List of Tables

Table 1 Descriptions of Pakistan's polyester industry .....	7
Table 2 Pakistan's import of polyester staple fiber .....	8
Table 3 Pakistan's exports of polyester staple fiber .....	8
Table 4 Trade analysis of ethylene glycol of Pakistan.....	10
Table 5 Trade analysis of ethylene glycol of India.....	10
Table 6 Lowest-price exporting countries of ethylene glycol.....	11
Table 7 Trade analysis of terephthalic acid & its salts of Pakistan.....	12
Table 8 Trade analysis of terephthalic acid & its salts of India .....	13
Table 9 Lowest-price exporting countries of terephthalic acid & its salts.....	14
Table 10 Descriptions of para-xylene contribution in cost of production.....	15
Table 11 Trade Analysis of para-xylene of Pakistan .....	16
Table 12 Trade analysis of para-xylene of India.....	16
Table 13 Lowest-price exporting countries of para-xylene .....	17

## Abbreviations and Acronyms

APTMA	All Pakistan Textile Mills Association
HS	Harmonized System of Coding
US	United States
UAE	United Arab Emirates
USD	US Dollar
PTA	Preferential Trade Agreement
FTA	Free Trade Agreement
DMT	Dimethyl Terephthalate
PET	Polyethylene Terephthalate
rPET	(Recycled) Polyethylene Terephthalate
TPA	Terephthalic Acid & its salts
CTA	Crude Terephthalic Acid
PTA	Purified Terephthalic Acid
PSF	Polyester Staple Fiber
MEG	Mono-Ethylene Glycol
PX	P-xylene (Para-xylene)
PRAL	Pakistan Revenue Automation (Private) Limited
NTC	National Tariff Commission
CAGR	Combined Annual Growth Rate
DTRE	Duty & Tax Remission for Export
EFS	Export Facilitation Scheme
Ltd.	Limited



## Executive Summary

After cotton, polyester staple fiber is the most important raw material for the textile industry. It is a key component in the textile industry, and is used to make a variety of textile and clothing items. Pakistan's polyester industry has a total production capacity of 534,800 metric tons of polyester staple fiber (PSF). The polyester industry only utilized 66 percent of its total installed capacity by producing 353,079 metric tons of PSF in FY2020, which has sharply declined from 463,450 metric tons in FY2019.

The polyester industry imports several organic chemicals as basic raw material to produce polyester staple fiber e.g. para-xylene, ethylene glycol and purified terephthalic acid (PTA) (also produced domestically from p-xylene). Polyester staple fiber is obtained from polyethylene terephthalate (PET) resin, processed from purified terephthalic acid (PTA) and ethylene glycol. Pakistan imports almost \$52 million of purified terephthalic acid (PTA) and \$151.5 million of ethylene glycol. While, Pakistan also imports para-xylene worth around \$174.7 million, to produce PTA domestically.

The goal of our study is how to improve trade balance of polyester fiber, and is to utilize all existing capacities of polyester industry. To realize this objective, trade policy can influence through several ways. e.g. tariffs or custom duties. Although, National Tariff commission (NTC) has efficiently utilized all tariffs or duties, suitable for domestic industry. NTC has also imposed an anti-dumping duties on Chinese exporters (ranging from 2.78 to 6.82 percent) as on January 26<sup>th</sup>, 2022, to protect polyester industry from dirty competition. Additionally, the study aims to assist for suitable import partner, due to costly imports of raw material. As Pakistan imports p-xylene around 10 percent higher prices, while, ethylene glycol and PTA at double prices, as comparison to India.

Pakistan produces most of polyester staple fiber (PSF) domestically by importing its basic raw materials e.g. para-xylene, ethylene glycol and PTA, and restrict its import by imposing 11% tariff. Most of the purified terephthalic acid (PTA) is produced domestically by importing para-xylene and acetic acid. Pakistan imposes 16 percent custom duty, and an additional custom duty of 4 percent on PTA, to protect domestic chemical industry. Although the polyester industry is subject to charge only 5 percent of custom duty, under fifth schedule.

While the purified terephthalic acid (PTA) manufacturers in Pakistan is only subject to a 2 percent additional customs duty on its raw material (para-xylene). While, ethylene glycol is the second major import, and it's also used in manufacturing PSF, as it reacts with PTA, to produce



polyester monomer. Imports of ethylene glycol into Pakistan are subject to a 0 percent customs duty. However, an additional custom duty of 2 percent is imposed on ethylene glycol. Custom duty has been exempted on these (PSF & PTA) industries, under the regulation of fifth schedule. While, DTRE (Duty and Tax Remission for Export) and Export Facilitation Scheme (EFS) 2021 reimburse the import duty, Sales Tax, Federal Excise Duty, and Withholding Tax on acquisition of imports and local purchase of inputs for manufacturer cum exporters, and for commercial exporters.

The polyester industry and the PTA industry would also benefit by switching, to low-priced imports of both of the basic raw materials e.g. p-xylene, ethylene glycol etc. These measures may benefit the polyester (PSF) industry without harming domestic PTA producers. This study exhibits costly imports of basic raw material para-xylene at \$0.69 per kg, in comparison to India, which imports at \$0.63 per kg. The expensive imports of p-xylene lead to protection of the domestic chemical (PTA) industry. Ethylene glycol is the second basic chemical for the polyester industry. It is also imported at \$0.89 and \$0.85 per kg from Kuwait and Saudi Arabia. While the same product is imported at \$0.46 and \$0.47 from the same countries by India. These high costs have become the major cause of the higher polyester production costs in Pakistan.

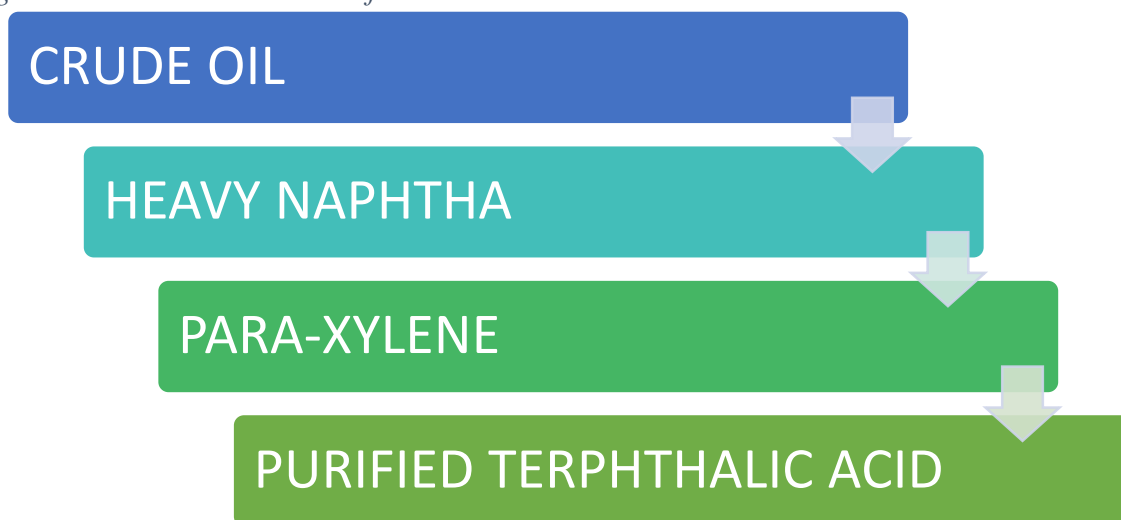
The reduction in the price of p-xylene will directly benefit the domestic PTA producers. It may reduce PTA prices domestically and can create opportunities to supply PTA to neighboring countries. It will also help to reduce the cost of raw materials for the polyester industry. While lowering the cost of importing ethylene glycol will directly benefit the polyester industry. These two measures will boost domestic demand for polyester staple fiber and purified terephthalic acid and will also enhance the export potential of the polyester and textile industries of Pakistan.

## Chapter 1 Introduction

The term synthetic fiber refers to a man-made fiber created from a non-naturally occurring resource also referred to as synthetic polymers. Synthetic fibers are created in factories from chemicals and processed into fibers or threads which are then woven or knitted to make fabrics.

Among all the man-made synthetic fibers present in the world, Polyester Staple Fiber (PSF) has emerged as the fastest-growing fiber. The process begins with air oxidation of para-xylene, using Acetic acid as solvent to manufacture Purified Terephthalic Acid (PTA). In the first stage, air is blown into the oxidation reactor containing a mixture of Para-xylene, Acetic Acid and a catalyst. As a result of this reaction, Crude Terephthalic Acid (CTA) is formed, which is then crystallized and dried.

*Figure 1 How PTA is obtained from Crude Oil*



*Source: Lotte Chemicals Pakistan Ltd.*

The later stage known as purification, CTA is re-dissolved in hot water, co-products are removed by hydrogenation and PTA is produced which is again crystallized and dried. This process ensures that the 99.98% purity is achieved. The purification process is necessary for manufacturing the polyester fiber products<sup>1</sup>.

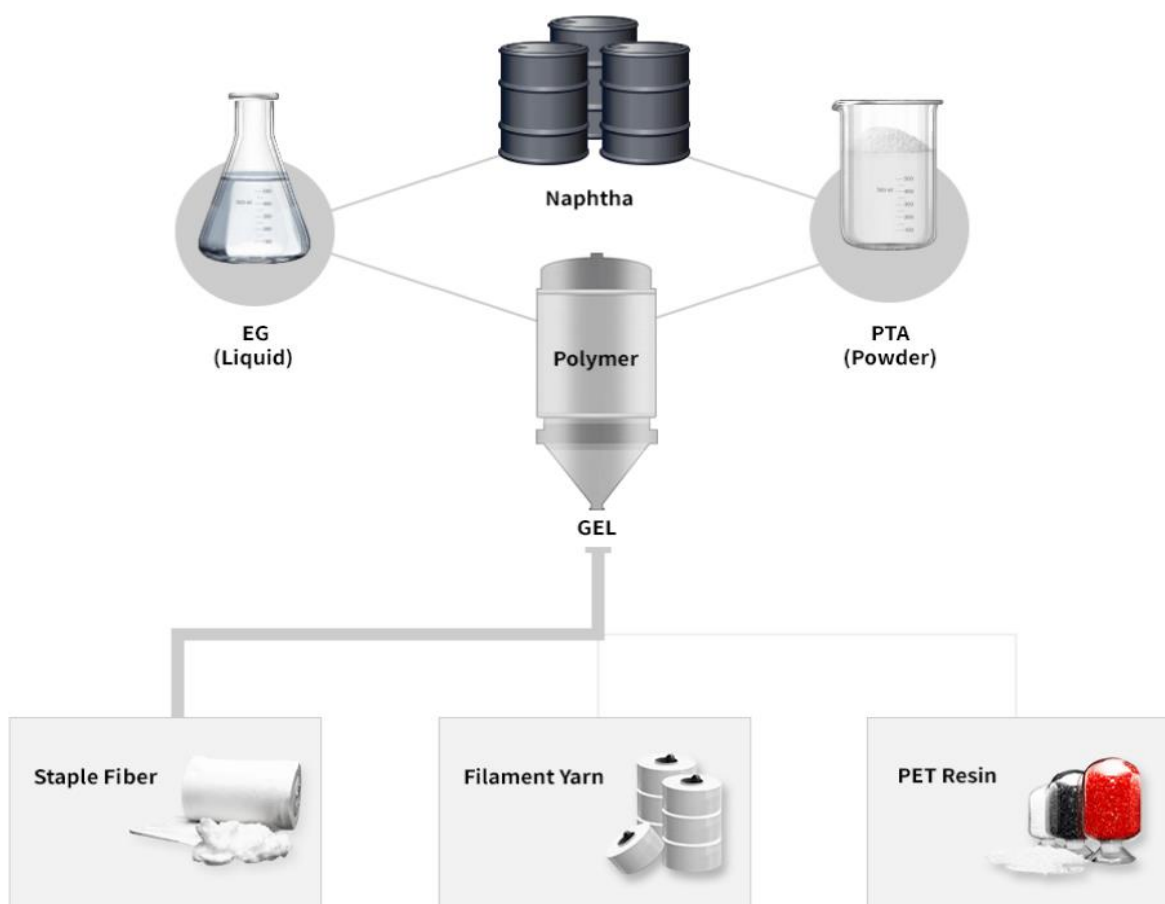
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<sup>1</sup> Lotte Chemical Pakistan Ltd.



Purified Terephthalic Acid (PTA) is a white powder, dissolved into hot Mono-Ethylene Glycol (MEG) to produce Polyethylene Terephthalate (PET). It is obtained through the copolymerization process of purified terephthalic acid and ethylene glycol. Polymerization process is carried out at high temperatures ( $290\text{ C}^0 - 300\text{ C}^0$ ) in a total vacuum<sup>2</sup>. Finally, it turns out to a final product polyethylene terephthalate (PET), a thick viscose liquid. The production of 1ton polyethylene terephthalate (PET) requires 0.85-0.86 tons of purified terephthalic acid (PTA) and 0.33-0.34 tons of MEG (ethylene glycol)<sup>3</sup>.

Figure 2 Manufacturing Process of Polyester staple fiber



Source: VNpolyfiber

Polyethylene terephthalate (PET) is in the form of thick viscous liquid, a polymer. The polymer is then pumped to melt spinning machines. This melt-spun method is used to obtain continuous filaments of polyester fiber which is known as tow. Many other processes are applied to this tow

<sup>2</sup> <https://vnpolyfiber.com/basic-information-of-polyester-staple-fiber/>

<sup>3</sup> <https://help.eaglesmarkets.com/hc/en-us/articles/900002069726-Basic-knowledge-of-PTA-Futures-variety-overview>



to further enhance their properties. And in the last stage, to get staple fibers these polyester filaments are cut in small fixed lengths similar to those of cotton fibers. These small fibers are called Polyester Staple Fiber (PSF).

Sometimes these polyester fibers are made from PET Chips or from Polyester waste from recycled post-consumer PET bottle flakes. The ones which are produced directly from PTA and MEG or PET Chips are known as Virgin PSF and the ones which are made from recycled PET Flakes are called Recycled PSF.

### **Background of the study**

The Pakistan polyester industry is the backbone of the textile sector. It has total production capacity of 534,800 metric tons of polyester staple fiber (PSF), according to annual industrial reports, 2020. Pakistan's polyester industry produces 353,079 metric tons of polyester staple fiber (PSF) by utilizing 66% of its total installed capacity. While, annual demand for (PSF) is around 461,632 metric tons in 2020, fell by more than 11 percent, from 518,243 metric tons from FY2019. Domestic polyester industry meets 76 percent or 353,079 metric tons of total demand, while, remaining 24 percent or 110,680 metric tons is imported, according to PBS, 2020<sup>456</sup>. Pakistan imports PSF from Indonesia, China, Thailand, and Rep. of Korea. Pakistan also exports \$3.3 million or 2,127 metric tons of PSF, during 2020<sup>7</sup>.

Pakistan imports almost \$52 million of purified terephthalic acid (PTA) and also imports its raw material, para-xylene, to produce it domestically. Para-xylene is the largest imported organic compound. Pakistan imports \$174.7 million of para-xylene. Ethylene glycol (Mono-ethylene glycol) is the second major import among organic chemicals and is used as feedstock in producing PSF. Pakistan imports \$151.5 million of ethylene glycol. The figure below describes the procedure to obtain polyester fiber. P-xylene is used to produce purified terephthalic acids (PTA). PTA and ethylene glycol are further used to produce polyester staple fiber.

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<sup>4</sup> Ibrahim Fibers Limited, 2020

<sup>5</sup> ICI Polyester Ltd, 2020

<sup>6</sup> Rupali Polyester Limited, 2020

<sup>7</sup> Pakistan Bureau of Statistics, 2020-21



Polyester staple fiber is the major raw material after cotton for the textile industry. Pakistan produces PSF domestically in large quantity, by importing p-xylene and ethylene glycol. And, it also imposes 11 percent custom duty to restrict its import. PSF industry is also facing un healthy competition from China, and Malaysia. And, it imposes an anti-dumping duty (ranging from 2.78 to 6.82 percent) as on January 26<sup>th</sup>, 2022, to protect polyester industry from dirty competition<sup>8</sup>.

Para-xylene is used to produce PTA, the most important and widely used ingredient in PSF industry. Pakistan imposes 16 percent custom duty, and an additional custom duty of 4 percent on PTA, to protect domestic chemical (PTA) industry. However, the fifth schedule of custom act has reduced the tariffs to only 5 percent for industrial uses<sup>9</sup>. Purified terephthalic acid (PTA) has relatively higher transportation costs than its raw material, p-xylene, which may exhibit higher import costs. In Pakistan, the PTA industry e.g. Lotte Chemicals Pakistan Ltd. is exempted from any custom duty on its raw material (para-xylene and acetic acid).

Ethylene glycol is the second major import, and it's also used in manufacturing PSF, as it reacts with purified terephthalic acid (PTA), to produce polyester monomer or Polyethylene Terephthalate (PET). Pakistan imposes 0 percent custom duty on imports of ethylene glycol. While, an additional custom duty of 2 percent is applied on ethylene glycol. However, it is reimbursed to manufacturers cum exporters or commercial exporters of polyester staple fiber, under Duty & Tax Remission for Exports (DTRE) and Exports Facilitation Scheme (EFS) 2021 scheme<sup>10</sup>.

### **Problem Statement**

The study reveals costly imports of basic raw material para-xylene at \$0.69 per kg in Pakistan, in comparison to India, which imports it at \$0.63 per kg. The expensive imports of p-xylene lead to protection of the domestic chemical (PTA) industry. Ethylene glycol is the second basic chemical for the polyester industry. It is also imported at \$0.89 and \$0.85 per kg from Kuwait and Saudi Arabia. While the same product is imported at \$0.46 and \$0.47 from the same countries by India. Pakistan also imports PTA at \$1 from Thailand. While, India imports PTA at half price \$0.48 from similar country. Pakistan pays almost twice as much per kg for its primary raw material for the

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<sup>8</sup> ADC No. 46/2015/NTC/PFY National Tariff Commission, Govt. of Pakistan.

<sup>9</sup> FIFTH SCHEDULE TO THE CUSTOMS ACT 1969(IV OF 1969) [see section 18]

<sup>10</sup> <https://fbr.gov.pk/fbr-notifies-export-facilitation-scheme-2021/163078>



polyester industry. Higher import prices have become the major cause of the higher costs of production. Moreover, expansive PSF also damages exports of textile industry.

The study may indicate that, firstly, we should reduce the import cost of two primary organic compounds (p-xylene and ethylene glycol). The reduction in the import bill of p-xylene will directly benefit the domestic PTA producers. It may become the reason to reduce PSF prices domestically, and reduce its import bill and capitalize domestically installed capacities. It will also help to reduce the cost of raw materials for the PTA industry. While lowering the cost of importing ethylene glycol will directly benefit the polyester industry. The reduction in import prices of basic raw material will boost domestic demand and production of polyester staple fiber and purified terephthalic acid and will also enhance the export potential of the PTA and PSF industries.

### **Objective of the Study**

This study contributes in many ways. First, it studies any expected flaws in tariff structure. However, it is found that tariff structure is sufficiently rationalized by National Tariff commission (NTC), mentioned in fifth schedule of custom act 1969, of section IV. For instance, Pakistan has imposed a 2 percent additional custom duty on p-xylene and ethylene glycol, both of them has been reimbursed under DTRE and EFS 2021 schemes, if PSF and PTA industries are exporting their output. These chemicals are essential ingredients in the PTA, PSF and textile industries. While, PTA imports are subject to 16 percent custom duty and an additional custom duty of 4 percent. The custom duty has been reduced to 5 percent under fifth schedule of custom act 1969, of section IV, for PSF industries.

Second, this study focuses on reducing per unit cost of basic raw materials for PSF production and choosing the suitable trading partners preferably for low priced imports, as Pakistan imports purified terephthalic acid and ethylene glycol at double the market average (median) prices, as well as p-xylene at 9–10 percent higher prices. Finally, the main objective of all these measures is to materialize trade potential in all sectors, e.g., the chemical industry and the textile industry, and to exploit all existing capacities in the polyester industry and the textile industry. And, it may attract further investment opportunities in the textile sector domestically.

### **Significance of the study**

This study will reveal that imports of basic feedstock at competitive prices will reduce the cost of production of purified terephthalic acid (PTA) and polyester staple fiber (PSF), and will also

reduce the import bill of PTA and PSF by a large amount. These measures will boost domestic demand for polyester staple fiber and purified terephthalic acid, and will also enhance the export potential related sector e.g. textile sector.

This study may exhibit trade creation in all related sectors of the economy. While cost reductions will increase exports of polyester staple fiber and polyester-made articles. This study will also pave the way to broaden the trade basis by reaching new trade partners, mostly opening towards Central Asian and East Asian countries, e.g., Kazakhstan and Russia.

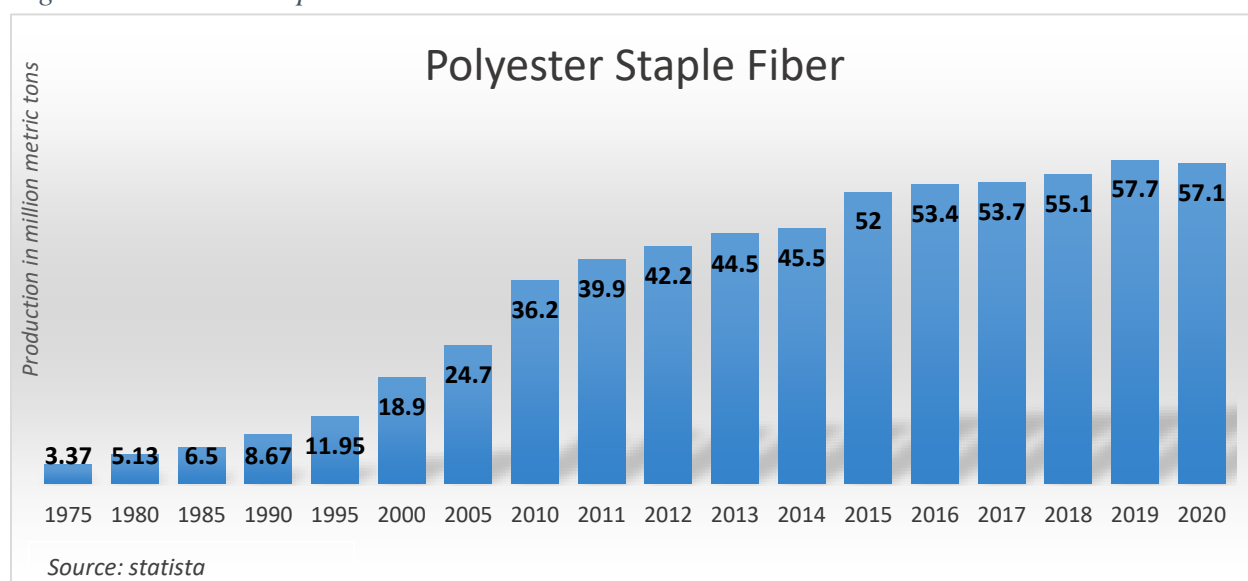
## Chapter 2 Analysis of the study:

This study is likely to compare the prices of basic raw materials used in the production of polyester staple fiber (PSF). This section will examine the domestic import prices of raw material in comparison with India. This study will also consider tariff rationalization of major organic used as feedstock in producing polyester fiber.

### Polyester Staple Fiber

Polyester Staple fiber (PSF) is a synthetic man-made fiber prepared directly from purified terephthalic acid (PTA) and mono-ethylene glycol (MEG) or from polyethylene terephthalate (PET), a polyester waste or from recycled post-consumer PET bottle flakes.

Figure 3 Global PSF production





This figure above depicts the worldwide production of polyester staple fibers from the period 1975 to 2020. In 1975, there were some 3.37 million metric tons of polyester fibers produced worldwide. The production rose sharply after 1995. By 2020, global polyester fiber production has increased to 57.1 million metric tons<sup>11</sup>.

The revenue from the apparel market was estimated at \$1,942,644 million for 2020, and the market is further expected to grow at a CAGR of over 4% during the forecast period. This would create ample opportunities for the polyester staple fiber market to grow during the forecast period<sup>12</sup>.

The textile industry is the most prominent sector of Pakistan's economy. It requires a stable supply of polyester staple fiber, as it is the most important feedstock after cotton. Pakistan has a total installed (production) capacity of 534,800 metric tons, but only 461,632 metric tons are produced (in 2019), accounting for 88.5 percent of total production capacity. The production has sharply decline to 353,079 metric tons during 2020, due to the Covid-19 pandemic. The total demand for PSF is around 518,243 metric tons (as reported in 2019). The remainder of the demand is met by importing approximately 59,813 tons of PSF from Indonesia, China, Thailand, and the Republic of Korea.

*Table 1 Descriptions of Pakistan's polyester industry*

Descriptions	FY 2019	FY 2020
Installed Capacity (tons)	534,800	534,800
Utilized Capacity (%)	86%	66%
Achieved Production	463,450	353,079
Imports (PSF) (tons)	59,813	110,680
Imports (% of Annual Demand)	11.5%	24%
Annual Demand (tons)	518,243	461,632
Local Sales (%)	88.5%	76%
Exports (PSF) (tons)	5,020	2,127
<i>Source: Author's own calculation</i>		

The polyester industry has sufficient production capacity to meet domestic demand. Despite this, Pakistan's import bill for polyester staple fiber (PSF) surpasses \$100 million annually in 2020. The PSF import rose significantly over Covid-19 period, as before it was around \$67 million. Pakistan

<sup>11</sup> Statista Database company, 2021

<sup>12</sup> Mordor Intelligence, 2020

imports most of its polyester staple fiber from China, Indonesia and Rep. of Korea. Table also indicates that the average prices of PSF has fallen significantly in 2020, due to fall in PSF demand.

*Table 2 Pakistan's import of polyester staple fiber*

Partner	2019			2020		
	Value in US (\$)	Quantity (kg)	Per Unit (\$)	Value in US (\$)	Quantity (kg)	Per Unit (\$)
World	\$ 67,979,070	59,813,045	\$ 1.14	\$ 104,566,847	110,679,812	\$ 0.94
China	\$ 37,451,678	34,096,082	\$ 1.10	\$ 39,498,698	40,755,146	\$ 0.97
Indonesia	\$ 8,588,464	7,385,650	\$ 1.16	\$ 26,633,029	29,765,919	\$ 0.89
Korea	\$ 4,813,477	4,055,717	\$ 1.19	\$ 4,344,308	4,083,861	\$ 1.06

*Source: Pakistan Bureau of Statistics*

Pakistan has exported polyester staple fiber (PSF) around \$6 million during 2019, however, a sudden decline in exports to half is seemed, during 2020, due to fall in global demand for PSF. Pakistan exports polyester staple fiber to several countries e.g. United States, Turkey, and Bahrain. Pakistan exports almost half of PSF at single destination (United States). Table 3 also highlights that Pakistan seems uncompetitive in terms of PSF prices, as average prices of exports in last couple of years are considerably above average import prices of PSF, mentioned in table 2.

*Table 3 Pakistan's exports of polyester staple fiber*

Partner	2019			2020		
	Trade Value (\$)	Quantity (kg)	Per Unit (\$)	Trade Value (\$)	Quantity (kg)	Per Unit (\$)
World	\$ 6,309,087	5,019,550	\$ 1.26	\$ 3,305,556	2,126,599	\$ 1.55
USA	\$ 3,002,624	1,965,394	\$ 1.53	\$ 2,170,609	1,001,768	\$ 2.17
Turkey	\$ 890,882	1,006,279	\$ 0.89	\$ 568,928	572,266	\$ 0.99
Bahrain	\$ 414,096	216,044	\$ 1.92	\$ 317,579	140,300	\$ 2.26

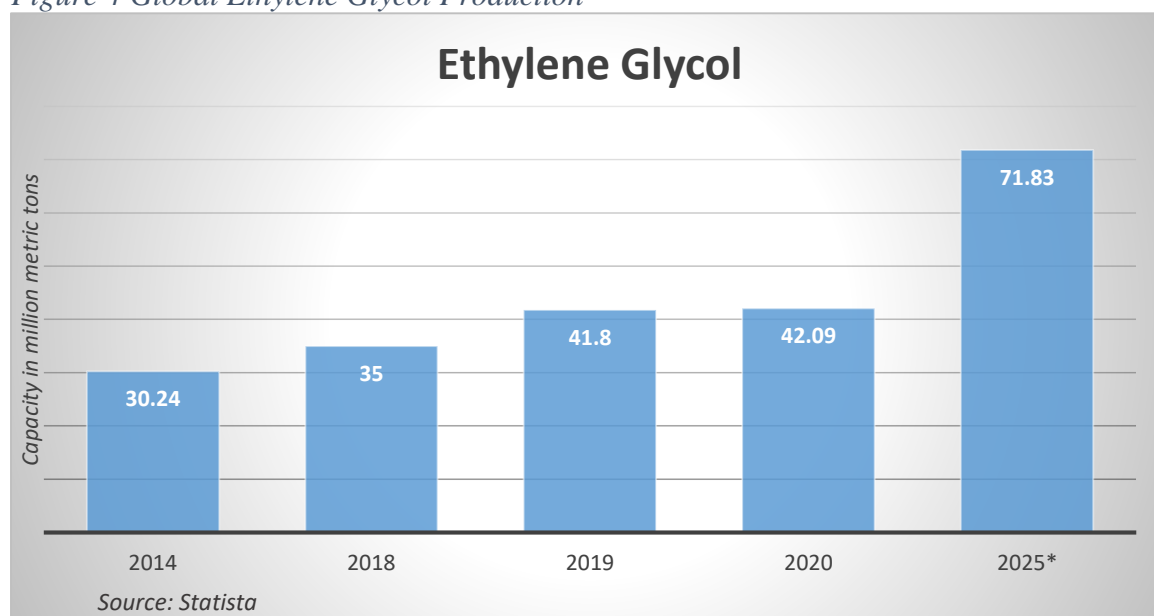
*Source: Pakistan Bureau of Statistics*

The main reason behind imports of PSF is the domestically higher cost of production. The increased cost could be attributed to higher-priced imports of raw material. It has led to the non-competitiveness of the polyester industry. Pakistan imports three basic organic compounds used (directly or indirectly) in the production of PSF. Pakistan imports \$151.5 million of Ethylene Glycol and \$52 million of Purified Terephthalic Acid, directly used in producing PSF. While, Pakistan also imports \$174.7 million of para-xylene, which is used in manufacturing purified terephthalic acids.

## Ethylene glycol

Ethylene glycol is a useful industrial compound found in many consumer products, examples include antifreeze, hydraulic brake fluids, some stamp pad inks, ballpoint pens, solvents, paints, plastics, films, and cosmetics<sup>13</sup>. Global production of Ethylene glycol is recorded slightly more than 30 million metric tons in 2014, and gradually moved toward 42 million metric tons in 2020. And it is expected to have a global production capacity amounting to more than 70 million metric tons in 2025. That is a fairly significant increase from the world's production capacity of ethylene glycol in 2020, which was approximately 42 million metric tons.

Figure 4 Global Ethylene Glycol Production



Pakistan imports ethylene glycol, a petrochemical compound, from Kuwait and Saudi Arabia. Ethylene glycol is the second major organic compound used as an important raw material in the PSF industry along with purified terephthalic acid and its salts. Pakistan imports around \$151.5 million worth of ethylene glycol at unit cost \$0.90 per kg and \$0.86 per kg from Kuwait and Saudi Arabia, respectively. Pakistan also imports ethylene glycol from UAE at a unit cost of \$0.70.

<sup>13</sup> National Institute for Occupational Safety and Health (NIOSH)





*Table 4 Trade analysis of ethylene glycol of Pakistan*

HS Code	Reporter	Trade Flow	Trade Value (\$)	Quantity (kg)	Per Unit	Partner
290531	Pakistan	Import	\$ 77,372,475	86,389,810	\$ 0.90	Kuwait
290531	Pakistan	Import	\$ 64,492,449	75,283,270	\$ 0.86	S. Arabia
290531	Pakistan	Import	\$ 7,665,867	10,927,923	\$ 0.70	UAE

Source: Comtrade

In comparison to Pakistan, India imports at half the cost. India imports ethylene glycol at \$0.46 per kg and \$0.48 per kg from Kuwait and Saudi Arabia respectively. And, India also imports at \$0.40 per kg from the USA. While, India exports ethylene glycol to China and the United States at unit costs of \$0.51 per kg and \$1.03 per kg, respectively. The study will likely suggest domestic importers to look for competitive prices in the international market.

*Table 5 Trade analysis of ethylene glycol of India*

HS Code	Reporter	Trade Flow	Trade Value (\$)	Quantity (kg)	Per Unit	Partner
290531	India	Import	\$ 173,170,355	375,762,800	\$ 0.46	Kuwait
290531	India	Import	\$ 14,490,786	35,566,017	\$ 0.41	USA
290531	India	Import	\$ 54,240,496	113,656,000	\$ 0.48	S. Arabia
290531	India	Export	\$ 114,287,324	224,297,600	\$ 0.51	China
290531	India	Export	\$ 14,293,953	13,882,000	\$ 1.03	USA
290531	India	Export	\$ 5,333,138	4,686,000	\$ 1.14	Indonesia

Source: Comtrade

India also imports ethylene glycol from similar countries at half the price in comparison to Pakistan, and also exports it to China at a slightly higher price. Nonetheless, China may benefit from lower transportation costs. The higher import prices of ethylene glycol are due to a large number of importers, buying in a small a very small quantity. The higher prices may also include the impact of fluctuations in petroleum prices as most organic chemicals are ultimately derived from crude oil through naphtha cracking plants.

Although, there is no custom duty at all on the import of ethylene glycol. However, an additional custom duty of 2 percent is applied on ethylene glycol. Which hurts most of PSF manufacturers, as they are not manufacturers cum exporters of PSF. While, PSF exporters are reimbursed all import duties, sales tax, withholding tax, and federal excise duties on acquisition of raw material, through imports or local purchase of inputs required to manufacture the output, meant for exports.

The table below highlights some of the lowest-priced exporting countries of ethylene glycol, including export giants of ethylene glycol e.g. the United States and Saudi Arabia. The table exhibits quantity units in kilogram of ethylene glycol, cost ranging from \$0.40 to \$0.47 per

kilogram. The list includes the countries geographically close to Pakistan e.g. Saudi Arabia (already imports from). While, the other majority of countries resides in Asia.

*Table 6 Lowest-price exporting countries of ethylene glycol*

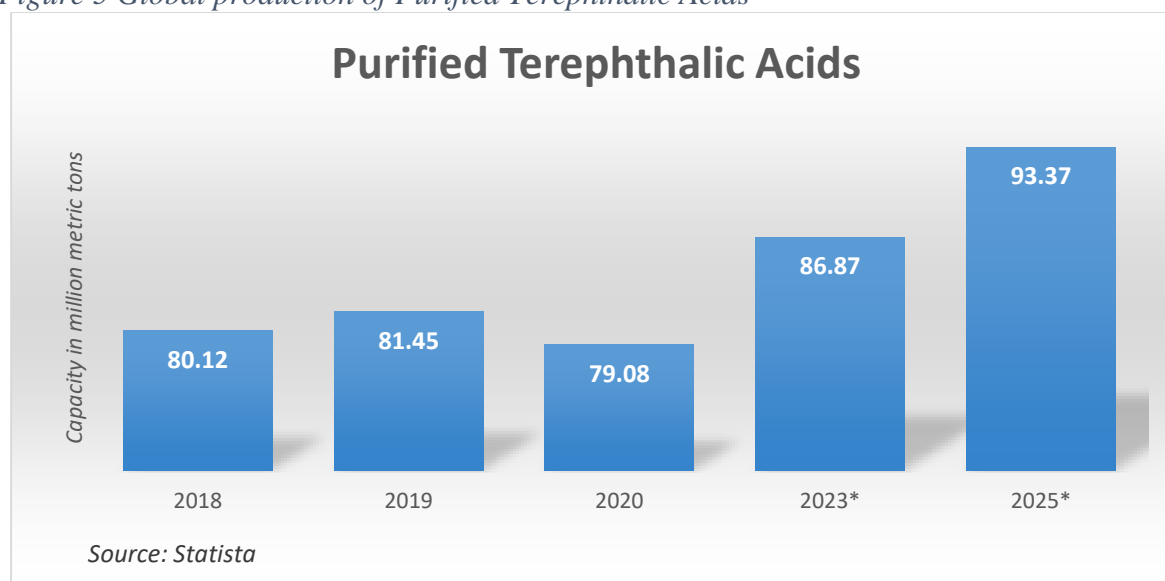
Period	Exporters	HS Code	Quantity (kg)	Trade Value (US\$)	Per Unit
2020	Canada	290531	1,576,227,533	\$ 638,273,474	\$ 0.40
2020	USA	290531	2,218,242,105	\$ 932,461,516	\$ 0.42
2020	Malaysia	290531	207,141,357	\$ 87,268,621	\$ 0.42
2020	Saudi Arabia	290531	2,146,526,519	\$ 907,147,565	\$ 0.42
2020	Japan	290531	259,724,000	\$ 115,273,506	\$ 0.44
2020	Taipei, China	290531	1,406,373,751	\$ 647,062,106	\$ 0.46
2020	Rep. of Korea	290531	309,234,636	\$ 142,841,321	\$ 0.46
2020	Singapore	290531	1,203,050,551	\$ 567,821,692	\$ 0.47

Source: Comtrade

### Terephthalic acid and its salts

Terephthalic acid and its salts are the most important organic chemical compounds in the petrochemical industry. In 2020, the market volume of purified terephthalic acid (PTA) worldwide amounted to nearly 79.1 million metric tons, a decline from 81.45 million metric tons. It is forecasted that the market volume of this organic compound will grow to around 93.37 million metric tons worldwide in the year 2025. The global industry utilizes around 65 percent of the world's total PTA in manufacturing polyester staple fiber (PSF), indicating its highest usage in the textile sector.

*Figure 5 Global production of Purified Terephthalic Acids*





The manufacture of polyester films based on PTA is used for audio and video recording tapes, data storage tapes, photographic films, labels etc. Polyethylene Terephthalate (PET) is the main derivative of PTA, and ethylene glycol. While, remaining 27 percent of terephthalic acid is processed to make PET to produce bottle resins<sup>14</sup>.

Pakistan also imports purified terephthalic acid (PTA) worth \$52 million, which is also a major feedstock used in the production of PSF, along with ethylene glycol. Pakistan imports PTA at a price of more than \$1 per unit from Thailand. While India imports PTA at half the price \$0.48 from the same country, Thailand. Pakistan also imports PTA from Malaysia at \$4.53 per kilogram, which is around 9 times higher than the price India imports from several other countries<sup>15</sup>. Pakistan also exports PTA to Turkey at a unit cost of \$0.24 per kilograms.

*Table 7 Trade analysis of terephthalic acid & its salts of Pakistan*

HS Code	Reporter	Trade Flow	Trade Value (\$)	Quantity (kg)	Per Unit	Partner
291736	Pakistan	Import	\$ 49,317,261	45,491,670	\$ 1.08	Thailand
291736	Pakistan	Import	\$ 1,358,532	300,000	\$ 4.53	Malaysia
291736	Pakistan	Export	\$ 338,039	1,408,241	\$ 0.24	Turkey

*Source: Comtrade*

Pakistan imposes a custom duty of 16 percent and an additional custom duty of 4 percent on PTA imports. The main reason for the imposition of the custom duty seemed to be to protect PTA producers. Although, after inclusion in fifth schedule tariffs are reduced to 5 percent only. While, under schemes of DTRE and EFS 2021, all import tariffs, sales tax, withholding tax, and federal excise duties are reimbursed to PSF exporters. Pakistan also exports PTA to other countries in Asia, the Middle East, and Gulf countries as domestic demand weakens<sup>16</sup>.

<sup>14</sup> Guichon Valves, 2021

<sup>15</sup> Ibrahim fibre ltd is importing at unexpectedly high prices, which exhibit irregularities in data of import quantities, reflecting per unit (kg) cost around Rs156,105 to Rs157,912, according to PRAL.

<sup>16</sup> Lotte Chemicals Pakistan Ltd, 2016



*Table 8 Trade analysis of terephthalic acid & its salts of India*

HS Code	Reporter	Trade Flow	Trade Value (\$)	Quantity (kg)	Per Unit	Partner
291736	India	Import	\$ 53,217,568	111,096,440	\$ 0.48	Thailand
291736	India	Import	\$ 45,068,605	75,652,000	\$ 0.60	R. Korea
291736	India	Import	\$ 42,652,166	81,538,980	\$ 0.52	Belgium
291736	India	Export	\$ 18,281,213	41,809,000	\$ 0.44	Turkey
291736	India	Export	\$ 14,948,027	33,713,000	\$ 0.44	Oman
291736	India	Export	\$ 13,981,025	27,682,005	\$ 0.51	S. Africa

Source: Comtrade

The PTA market has grown due to the expansion of the PET industry and as the substitution of Dimethyl Terephthalate (DMT). The total domestic production capacity of PTA is 500,000 metric tons. While, Pakistan only produces 416,092 metric tons in 2020, having a sharp decline of 11 percent since 2019<sup>17</sup>.

PTA is in solid form and its transportation is more expensive than P-xylene. Hence, the production of PTA favors close consumers only. In Pakistan, there is the establishment of very large production houses, e.g., Lotte Chemicals Pakistan Ltd., the sole supplier of PTA in Pakistan. Since its inception, the company has focused on meeting domestic PTA demand. However, if domestic demand slows down, Pakistan will then export to other countries. Quality of domestic PTA meets all international standards and is well known to key customers in Asia and the Middle East region, according to Lotte chemicals Pakistan. The profit margin in PTA is healthy and stable compared to P-xylene. Hence, it is preferable to go for forward integration, despite the logistic disadvantages<sup>18</sup>.

The case of imports of purified terephthalic acids is similar to that of ethylene glycol, as Pakistan imports it at more than double the price. Pakistan imports terephthalic acid from Thailand at a unit cost of \$1.08 per kilogram. While India imports from Thailand at \$0.48 per kilogram, the table exhibits the per unit cost of terephthalic acid exports as low as \$0.20, \$0.24, and \$0.29 in Russia, Pakistan, and Saudi Arabia, respectively.

<sup>17</sup> Lotte Chemicals Pakistan Ltd, (Annual Report, 2020)

<sup>18</sup> PX-PTA Report: 2008, Fiber2fashion



Table 9 Lowest-price exporting countries of terephthalic acid &amp; its salts

Period	Exporters	HS Code	Quantity (kg)	Export Value (\$)	Per Unit
2020	Russian Fed.	291736	5,287,252	\$ 1,052,373	\$ 0.20
2020	Pakistan	291736	1,408,241	\$ 338,039	\$ 0.24
2020	Saudi Arabia	291736	3,462,000	\$ 1,003,964	\$ 0.29
2020	Japan	291736	31,212,200	\$ 12,789,353	\$ 0.41
2020	Taipei, China	291736	1,056,084,408	\$ 480,008,057	\$ 0.45
2020	USA	291736	54,121,516	\$ 24,928,556	\$ 0.46
2020	Indonesia	291736	165,656,825	\$ 76,913,605	\$ 0.46
2020	China	291736	847,488,152	\$ 395,794,630	\$ 0.47
2020	Thailand	291736	896,174,866	\$ 418,810,529	\$ 0.47
2020	India	291736	136,659,511	\$ 64,121,652	\$ 0.47
2020	Rep. of Korea	291736	1,948,423,814	\$ 924,930,842	\$ 0.47
2020	Malaysia	291736	97,018,484	\$ 47,278,403	\$ 0.49

Source: Comtrade

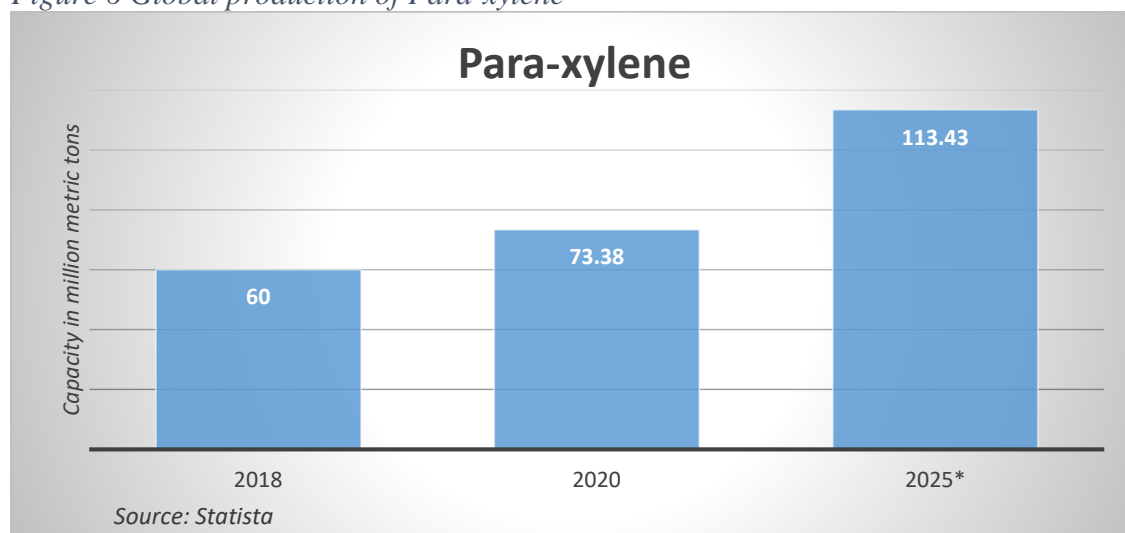
Most countries are exporting at unit prices ranging from \$0.41 per kilogram by Japan to \$0.49 per kilogram by Malaysia. Despite these figures, Pakistan imports from Thailand at \$1.08 per kilogram, and imports from Malaysia at a per unit cost of \$4.53.

### Para-xylene

The PTA industry requires para-xylene as a basic feedstock for its production. Para-xylene (p-xylene) is a major import component in organic chemicals, importing around \$174.7 million. P-xylene is an aromatic compound that is commonly derived from crude oil sources and extracted from the mixed xylene stream. P-xylene is the most widely used of the three xylene isomers (the two others being Ortho-xylene and Meta-xylene). In 2019, P-xylene accounted for more than 85% of global mixed xylene demand<sup>19</sup>. As of 2020, the organic chemical p-xylene had a total production capacity of some 73.4 million metric tons worldwide. The output grew from 60 million metric tons in 2018, having a growth of 16.5% in 2 years. This figure is forecasted to increase significantly by 2025 to 113.4 million metric tons.

<sup>19</sup> IHS Markit, 2021

Figure 6 Global production of Para-xylene



P-xylene costs are by far the most important determinant of PTA production costs, accounting for 85 percent of total costs. The next two most important cash cost contributors are utilities and acetic acid make-up. However, these two items account for only 4 percent and 3 percent of total costs, respectively. Owing to the extreme importance of P-xylene cost to the economics of PTA production, most of the world's top PTA producers are back integrated into P-xylene.

Table 10 Descriptions of para-xylene contribution in cost of production

Raw Material	Cost of Production (%)
Para-xylene	85.1
Acetic-Acid	2.7
Hydrogen	0.0
Catalysts	0.3
Utilities	3.9
Manpower, Maintenance	1.0
Overhead allocated fixed costs	1.4
Depreciations	5.5
Total Costs (excluding corporate charges, freight and sales costs)	99.9

Source: PX-PTA Report: 2008, Fiber2fashion

Pakistan imports p-xylene, an important petrochemical compound used in the production of purified terephthalic acid, a basic feedstock required for the production of polyester fiber. It is also the key organic compound indirectly impacts the polyester industry. Pakistan imports p-xylene from Saudi Arabia and Kuwait at a unit cost of \$0.69 and \$0.68 per kg, respectively. While, Pakistan does not export p-xylene at all.

*Table 11 Trade Analysis of para-xylene of Pakistan*

HS Code	Reporter	Trade Flow	Trade Value (\$)	Quantity (kg)	Per Unit	Partner
290243	Pakistan	Import	\$ 117,381,426	169,557,850	\$ 0.69	S. Arabia
290243	Pakistan	Import	\$ 57,320,818	84,591,810	\$ 0.68	Kuwait

Source: Comtrade

In comparison with Pakistan, India imports from Singapore, Japan, and Kuwait at unit costs of \$0.63, \$0.62, and \$0.64, respectively. Pakistan's importers are still paying almost 9.5 percent higher prices than India's importers. India also exports p-xylene to China, Malaysia, and Indonesia at a unit price of \$0.60 per kilogram. The higher prices may include the impact of fluctuations in petroleum prices as the p-xylene is ultimately derived from crude oil through a naphtha cracking plant. Imports of p-xylene is subject to 0 percent custom duty. While, an additional customs duty of 2 percent is imposed in its import. However, these tariffs and all other duties and taxes are reimbursed to under DTRE and EFS 2021, schemes.

*Table 12 Trade analysis of para-xylene of India*

HS Code	Reporter	Trade Flow	Trade Value (\$)	Quantity (kg)	Per Unit	Partner
290243	India	Import	\$ 197,104,333	314,097,000	\$ 0.63	Singapore
290243	India	Import	\$ 161,758,078	262,390,008	\$ 0.62	Japan
290243	India	Import	\$ 31,276,562	48,534,000	\$ 0.64	Kuwait
290243	India	Export	\$ 917,899,552	1,525,392,600	\$ 0.60	China
290243	India	Export	\$ 277,960,670	464,753,200	\$ 0.60	Malaysia
290243	India	Export	\$ 272,119,025	457,225,540	\$ 0.60	Indonesia

Source: Comtrade

The table highlights some of the p-xylene exporting countries at the lowest possible per unit price. The table shows Kazakhstan as the lowest-priced exporter, charging \$0.40 per kilogram for p-xylene. The Republic of Korea is the largest p-xylene exporter, with more than \$3.4 billion in p-xylene exports. The table entirely exhibits per unit price of p-xylene ranging from \$0.40 per kilogram to \$0.61 per kilogram. Pakistan can find Kazakhstan and Russia as the lowest-priced as well as the closest-located countries. Although India also exports p-xylene and several other chemicals at low prices. But, due to strategic issues, Pakistan has to ignore any trade deal with India.

*Table 13 Lowest-price exporting countries of para-xylene*

Period	Exporters	HS Code	Quantity (kg)	Export Value (\$)	Per Unit
2020	Kazakhstan	290243	201,620,712	\$ 81,105,168	\$ 0.40
2020	Russian Fed.	290243	140,487,502	\$ 60,100,809	\$ 0.43
2020	Indonesia	290243	40,466,500	\$ 17,970,899	\$ 0.44
2020	Belgium	290243	72,145,443	\$ 36,573,865	\$ 0.51
2020	USA	290243	1,274,654,520	\$ 657,750,747	\$ 0.52
2020	Viet Nam	290243	598,890,328	\$ 319,098,889	\$ 0.53
2020	Belarus	290243	989,050	\$ 534,300	\$ 0.54
2020	Malaysia	290243	444,736,700	\$ 242,841,121	\$ 0.55
2020	Rep. of Korea	290243	6,075,069,427	\$ 3,436,561,044	\$ 0.57
2020	Germany	290243	144,662,224	\$ 83,671,048	\$ 0.58
2020	Taipei, China	290243	1,071,250,173	\$ 630,024,151	\$ 0.59
2020	India	290243	2,892,320,459	\$ 1,755,582,414	\$ 0.61

Source: Comtrade

### Chapter 3 Conclusion

The study indicates several problems affecting directly and indirectly the polyester industry, and it has turned out to be cost-uncompetitive for the whole textile sector of Pakistan. The higher cost of production domestically means less demand for local polyester production. Although, Pakistan has near to sufficient production capacity to meet its domestic demand, as of fiscal year 2020. Pakistan imports raw materials at higher prices, e.g., p-xylene, some of them almost at twice the price, e.g., ethylene glycol and purified terephthalic acids. Higher imports prices are the main cause of the high cost of production for the polyester industry, and it also causes inefficiencies in other industries like the textile and plastic industry.

Other findings include that custom duties and additional custom duties that also add some major contributions to the cost of the polyester industry has been declined significantly. And, no additional burden of duties is imposed at all. National Tariff Commission (NTC) has efficiently utilized all duties and tariffs in favor of domestic industry. The NTC has greatly contributed in growth of purified terephthalic acid (PTA) industry. And, it has also imposed antidumping duties to protect domestic polyester fiber industry from hazardous competition from abroad.

The domestic PTA and PSF manufacturers are well protected through the application of fifth schedule of custom act. Under this act, all custom duties have been removed or rationalized to greater extent from industrial imports of machinery and inputs, used as feedstock for industrial output. While, Duty and Tax Remission for Export (DTRE) and Export Facilitation Scheme 2021,





reimburse all import duties, sales tax, withholding tax and federal excise duty to all PTA and PSF manufacturers cum exporters, and commercial exporters.

However, an additional custom duty of 2 percent may harm small manufacturers, as they are not exhibited to exports. While, it also slightly restricting domestic demand for these organic chemicals e.g. P-xylene and ethylene glycol. While, removal of additional custom duty may encourage commercial importers to ensure local availability of both chemicals specially ethylene glycol for small buyers. And, it will reduce per unit cost of imports, as the both chemicals have almost industrial usage, and no prominent consumer usage.

Although, there are some irregularities found in PTA imports. As the quantities of PTA are reported too small than amount of PTA imported. It reflects that PTA is imported at price of Rs156,105 to Rs157,912 per kilogram. Which enlarge the import price of PTA to almost double than the original price. According to PRAL, the data exhibits the price of PTA mentioned there is similar with metric ton, rather than the price of kilogram. It also reveals that strong custom regulations are necessary to eliminate opportunistic behavior of industrial importers.

The study will benefit the whole industrial sector of Pakistan, e.g., the chemical industry, the polyester industry, and the textile industry, etc. And, the study will enhance export potential of PTA and PSF industry. While, in a broader context, the study will also contribute to trade openness and will improve the trade balance.

## **Chapter 4 Recommendations**

According to the study, Pakistan had already rationalized tariffs, mainly on imports of its primary raw materials such as p-xylene and ethylene glycol, and also reduced tariff on imports of purified terephthalic acid (PTA), under fifth schedule of custom act. While, Duty and Tax Remission for Export (DTRE) and Export Facilitation Scheme 2021, will reimburse all remaining duties and taxes to only manufacturers cum exporters, commercial exporters of PTA and PSF. These measures will directly benefit all industries, including the textile industry.

The other major gains can be obtained through low-priced imports, by removing additional custom duty to 0 percent for all commercial importers as both chemicals are entirely used for industrial purposes and have no consumer usage at all. It will ensure local availability of these chemicals for small buyers, and reduce per unit cost of imports. Moreover, custom officials should strictly



monitor the opportunistic behavior of raw material importers, those evading custom duties on imports.

For the purpose discussed above, importers from Pakistan had better to consider alternative exporting nations, those exhibiting low prices and those geographically located close to Pakistan, e.g., Kazakhstan and Russia, as they are among the low-priced suppliers of p-xylene and terephthalic acids. The remaining steps could be Free Trade Agreements (FTA) and Preferential Trade Agreements (PTA) for p-xylene and ethylene glycol with countries that exhibit low-priced exports.

The study will also recommend industries to move to more environmental friendly techniques of production, as the global trend for PSF production is moving to recycled polyethylene terephthalate (rPET), or recycled plastic bottles. Using rPET for polyester production may necessitate large investments, but the average cost is significantly lower than the conventional technique of production.



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